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'Mystery Hole' Strikes Again in Detroit Vote

By Thomas J. Morton
CW Midwest Bureau

DETROIT — With the recent history of the punched card primary still fresh in the minds of politicians and concerned citizens alike, Detroit tried another computerized election and again the final count appeared hopelessly delayed.

Again a "mystery hole" is bothering both the politician and the programmer and the charges and the countercharges are flying. And Detroiters are wondering what their city is trying to do to them.

Hinging on the outcome was a hotly contested gubernatorial race.

But this time, according to most opinions, certification of the vote seems highly improbable.

By midnight of election day, four hours after the polls had closed, only four of Detroit's 1,111 precincts had been tabulated. By 3 p.m. of the next day, only 200 precincts had been counted and it was 48 hours before Detroit had the final tabulation of votes completed.

In the primary, unexplained punches in test decks produced an overcount of exactly 1,111 extra votes, one for each precinct. The official explanation was that a card reproducing machine had made an extra hole in one card in a test deck and the final results were five out of six

test decks in error [CW, Sept. 16].

This time the "mystery hole" is a punch in the vote cards themselves at about M20 position in the ballot configuration.

In initial observation Los Angeles County seemed to have solved its previous vote count problems, but Flint, Mich., had a tough time with the weather. Stories on Page 4.

The card-to-tape program is designed to reject a card with a hole in that spot because the demonstration punched cards have a hole there and the program is geared to extract any demonstration cards inadver-

tently added to the ballots.

Now, according to reports, legitimate ballots with a punch at that configuration were being rejected. The rejection necessitates reproducing the card without reproducing the punch (approximately at column 3, row 9) and running the card again.

"It seemed," said an accuracy board member at one of the three counting centers, "that every other card had the rejection punch."

City Clerk George Edwards is claiming that the voters sabotaged the election by manually removing the chads from their ballots after removing them from the Votomatic machines.

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The XDS Sigma 9 uses a Teletype 35 KSR-based 7012 to communicate with the operator of the system. A 7017, based on the 35 ASR, is used to monitor the time-sharing software. In the background is the system's CPU; and to the left are two 7441 1,100 line/min printers.

XDS Sigma 9 Handles Varied I/O Job Mix

By Frank Piasta
CW Staff Writer

EL SEGUNDO, Calif. — The new Sigma 9, the largest system yet from XDS, is designed for both on-line commercial and scientific applications.

The Sigma 9 continues the trend toward commercial user appeal XDS initiated in the Sigma 6.

With up to 2-million-bytes of memory on-line and a cycle time of 900 nsec/4-byte word, the new system will give the prospective user of the IBM 370/155 size another system to consider.

Based on internal speed and system configuration, the XDS machine could be up to two and one-half times as fast as the 155 in performing jobs in a stream of scientific problems.

Commercial Mix

As the percentage of commercial work in a job mix gets larger, the advantage held by the Sigma would deteriorate until a totally commercial mix is encountered. In this situation, the Sigma's performance would be somewhat less than that of the 155.

Offsetting this would be the flexibility in the 9's configuration. Multiple central processors, up to four, and independent I/O processors would make possible a degree of simultaneity that

would be very difficult to achieve in the 370/155, enhancing throughput.

The Sigma 9 is organized around a high-speed CPU and as many as 11 I/O processors (IOPs) controlling I/O devices. Up to 12 access ports to memory can handle either multiple IOPs or CPUs, providing mul-

(Continued on Page 2)

By Edward J. Bride
CW Staff Writer

HOUSTON — Despite an economic pall which has reduced both travel and exhibit budgets, next week's Fall Joint Computer Conference is expected to be the third largest exhibit in the history of computers and directly related equipment.

Preregistrations closed last week, and approached the record of 2,000, giving conference sponsors late cause for "optimism," despite the recent cancellations of several exhibitors.

The conference will take place in the Astrodome, adjacent to the Astrodome.

The preregistration total is not especially startling, since it is still less than 10% of the generally estimated attendance predictions for the three-day affair

Nov. 17-19.

The American Federation of Information Processing Societies (Afips), sponsor of the semi-annual event, had been using planning figures of 30,000 attendees. Past estimates and the economic atmosphere considered, Afips officials have re-

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vised their thinking to around 20,000.

Other observers are more optimistic, and point to the growing Southwest market and Houston's proximity to the Detroit-Chicago megalopolis as possible incentives for increased

"local" participation.

Exhibition Dropouts

The mood of the exhibitors is not so positive. About 10% have cancelled their participation plans, citing economic measures as prime reasons.

Several stated they could not expect to make enough sales to justify the expenditures for the exhibit, since they, the exhibitors, were predicting decreased attendance.

Latest figures from Afips held that 265 exhibitors would use 840 booths. This is down from an "oversold" position of 1,000-plus booths last summer, with over 300 "confirmed" exhibitors, plus a growing waiting line.

Among recent dropouts were Univac ("reorientation of marketing objectives") and University Computing Co.

Attendance projections and exhibitor numbers are exceeded only by the past two conferences, in Atlantic City last spring, and Las Vegas last fall.

In noting the precedent-setting (Continued on Page 4)

Study Reveals Underuse

How Efficient Are DP Centers?

By Michael Merritt
CW Staff Writer

NEW YORK — During scheduled running hours, the average corporate computer spends about 30% of its time on reruns, maintenance, and in idle mode. Well-managed centers, however, spend only 19% of their time on these non-productive activities.

This is one of the conclusions reached by a recent study of 89 corporate DP centers using 155 computers conducted by A.T. Kearney & Co., management consultants.

Principal partner of the company, Walter J. Schroeder, told CW additionally that if the total round-the-clock available time was considered, the comparison between well-run DP centers and the average is even more dramatic; the 22 best companies in the survey were operating productively 68% of the time, while the average was only 40%.

The best companies spent 10% of their sched-

uled hours in idle mode, 6% on reruns, and 3% on maintenance. The average was 20% idle, 5% rerun, and 5% maintenance.

"Strangely enough, the largest centers had the poorest record," Schroeder said. "This is because of scheduling problems; the larger centers are harder to manage, because they have more structured, inflexible organizations."

The solution to the problem, Schroeder said, is new controls and more training.

Schroeder said that his firm's study has shown that the rosy dreams of effective use of computers have not come true. He cited three promises of the sixties that have not materialized:

- A reduction of middle-management personnel required by corporations as the computer began talking over routine decision making functions.

- Improved profitability and return on investment as a result of EDP functions fulfilling their

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For Weave Design

IBM Employee Receives Software Patent

By Edward J. Bride
CW Staff Writer

WHITE PLAINS, N.Y. — The first IBM employee to receive a software patent is Mrs. Janice Lourie, who programmed a computer to interface with a fabric loom and a video display terminal.

The results of the program are user-designed textile patterns, woven in real-time at the command of an operator with a light pen.

Mrs. Lourie is a Senior Institute staff member at IBM. She first applied for the patent three years ago, but it was only recently issued.

The "invention," based on the patented program, was first shown in the IBM display at the 1968 HemisFair in San Antonio. Visitors to that exhibit were given souvenir fabric patterns they had designed on a video display unit.

'Hard Copy Pattern'

Under the program, the operator draws an intended design on an IBM 2250 CRT terminal, the program translates the design into instructions for the loom, and a "hard copy" pattern is woven.

The designer/operator can make changes without redrawing the entire design, thus saving time in both the drawing and weaving stages.

Mrs. Lourie's technique replaces the time-consuming method of keypunching cards, using a hand-drawn pattern from graph-paper as a guide and the punched cards to instruct the loom.

IBM spokesmen said the company did not consider the award a true "software patent," since the design program is not a product, i.e. it is not being marketed.

The difference, one spokesman explained, is in the definition of "software," since IBM considers only "program products" and "system control programs" as being eligible for software patents.

A Patent Is a Patent

The award, then, is for a "significant concept," according to IBM, and is entitled "Graphical Design of Textiles," according to the Patent Office.

In legal jargon, the patent describes the invention as a "method of operating a data

processing system having... data manifesting means for graphically developing a textile weave design" from the outline on the display.

A specially designed loom, and

stitute recently acquired a 360/30 to perform administrative work, with the long-range goal of also using the Model 30 as a controller for the loom.

The "improved" form of the

the Fashion Institute, IBM noted.

Sidney Buchman, coordinator of data processing at the Fashion Institute of Technology, said it was feasible that the loom-computer tandem might be used for knitting, as well as weaving.

He said it takes only a little "imagination" to envision a sheep entering one end of an assembly line, and a knitted garment leaving the opposite end. But, Buchman did say the invention would be "put to good use" on an experimental and developmental basis.

The Fashion Institute has over 1,900 full-time students, all being trained for entry in the fashion industry.

Buchman didn't know, and IBM refused to speculate, on its possible entry into the fashion world. An IBM spokesman would only say that the Lourie invention was "not now a product," but he would not, as is company policy, elaborate on any plans.



Mrs. Janice Lourie and IBM patent attorney Charles P. Boberg discuss a portion of the patent description.

an improved version of the program, were both presented to the Fashion Institute of Technology in New York. The in-

designing program is covered by another of Mrs. Lourie's patent applications, and is being tested for "educational purposes" at

Sigma 9 Continues XDS Commercial Trend

(Continued from Page 1)

multiple, simultaneous access to core memory.

CPU, IOPs and memory each have individual clocking permitting asynchronous operation. Four-way interleaving in memory also results in higher effective memory speeds.

Two models of IOPs are available. The Dual-Channel Multiplexer IOP handles up to 32 peripheral devices at channel transfer rates up to 900,000 byte/sec in the multiplexing mode. The Rapid Access Disk (RAD) IOP is used with RAD storage units only. Data transfer rates up to 3-million byte/sec can be handled.

Up to 224 interrupts can be provided, with hardware determination of interrupt priority. Two blocks of 16 general-purpose registers are standard. These are optionally expandable to a maximum of 64 in increments of 16.

In addition to the decimal arithmetic capability required for commercial applications, the Sigma 9 provides fixed and floating point.

Word and double-word precisions are available in fixed and floating-point, halfword in fixed only.

Two real-time clocks are standard, with an extra two optional. Both master, and slave and master memory protect modes are available.

The basic architecture of the smaller Sigma computers was the foundation for the Sigma 9. This enables user programs now running on the Sigma 5, 6, and 7 systems to run without alterations on the new system, XDS said.

Sigma 9 will use all the peripheral equipment now in use with the other Sigma systems.

In addition, a new commercial line printer, the Model 7446, announced with the Sigma 9, will be available for use with the other Sigma systems. Scheduled for delivery in the third quarter of 1971, the device can print up to 132 columns at speeds as high as 1,500 line/min.

A typical Sigma 9 system, with 128K words of main memory and including a variety of peripheral equipment, will have a sale price of \$1,760,000. The one-year lease price will be \$41,000/mo.

| Model Features | XDS Sigma 9 | RCA 7 | Burroughs B5700 | IBM 370/145 | IBM 370/155 | NCR Century 300 |
|-----------------------------|----------------|--------------|--------------------|----------------|----------------|-----------------------|
| CPU | 20.5 to 18.2 | 14.4 to 36.8 | 10.9 to 18.2 | 10.4 to 18.4 | 21.5 to 45.2 | 9.8 to 61 |
| Monthly Rental (\$K) | 39.7 | 36.8 | (2 CPUs) | | | |
| Memory Size (K bytes) | 512 to 2,048 | 256 to 2,048 | 128 to 256 | 112 to 512 | 256 to 2,048 | 128 to 2,048 |
| Cycle Time/ Byte (nsec) | 225 | 190 | 625 | 135 | 60 | 163 |
| Byte/ Access Cycle | 4 | 4 | 6 | 2 | 2 | 4 |
| Channels | 352 | 7 | 4 | 5 | 6 | 11 |
| Max. Processors | 4 | 1 | 2 | 1 | 1 | 1 |
| Interleaving | 4-way | None | None | None | None | 4-way |

Chart compares XDS Sigma 9 with other recently introduced systems.

Xerox OS Suited for Local, Remote Batch Jobs

By Donald Leavitt
CW Staff Writer

EL SEGUNDO, Calif. — The development of a business-oriented operating system for use on the XDS Sigma 9, and on the older Sigma 6 and 7, emphasizes the company's new direction to a business user's processing environment.

The Xerox Operating System (XOS) is a transaction-oriented system designed primarily for local and remote batch business-type jobs. Scientific and time-sharing applications, areas previously stressed by XDS, can be handled concurrently with batch

jobs, but in a background mode, under XOS.

To support the commercial user, the system includes an XDS Cobol compiler which conforms to Ansi standards, a Meta-Symbol assembler, and a Data Management System. Extended XDS Fortran IV and Fortran Load and Go (Flag) compilers are also available along with a Sort/Merge utility and a Basic compiler.

XDS said that XOS provides both complete multiprogramming and multiprocessing capability.

To handle multiprogramming,

XOS uses the interrupt structure for internal task scheduling, and the system's memory map to allow programs to be stored without regard for contiguous core space. XOS uses dynamic resource allocation techniques to maximize the number of currently active jobs, the company said.

In supporting concurrent multiprocessing, the system treats remote batch jobs in the same manner as it does local jobs. Spokesmen said that as many as 48 time-sharing users will be accommodated by XOS. XOS provides for sequential,

indexed sequential direct-access and/or partitioned file formats on magnetic tape, rapid access fixed-head disk, and removable disk storage, XDS said.

Included in XOS, XDS said, is a generalized Telecommunications Access Method (TAM) that enables the user to process his applications programs from the telecommunications network.

The Xerox Operating System is scheduled for delivery in the third quarter of 1971, the company said, but time-sharing under XOS will not be available until the first quarter of 1972.

Manufacturer Safeguards For Data Called Inadequate

CW Midwest Bureau

CHICAGO — While high interest in security was shown at the recent well-attended American Management Association seminar on catastrophe prevention management, some of the experts and most of the attendees there felt that not enough was being done at the computer manufacturing level to safeguard data in the on-line environment.

It was pointed out in one of the seminar's question and answer periods that computers were being made larger and larger, faster and faster, a fact which, for economical operations, almost necessitated multisource use; but that next to nothing was being offered in hardware or in software to provide security for data transmission or access.

"Not only can data be stolen by wiretap," said Louis Scoma Jr., president of Data Processing Security, Inc. and a cochairman of the seminar, "but even data that is coded and unintelligible to the wiretapper can be sabotaged by wiretap."

He explained that data can be modified during transmission if the wiretapper knows his business.

Scoma placed the responsibility for on-line security with the corporate user and with the equipment manufacturer. "Not enough," he said, "is being done, and being done fast enough, to help solve the problem of data loss in transmission."

User Responsibility

He said that since manufacturers felt that data security could best be obtained by the addition of crypto equipment, it was the responsibility of the user to insist on built-in safeguards in hardware and in software.

"A scrambler is not and should not be the answer," he said.

Another speaker told of a government project in which a manufacturer is co-operating. Both the equipment and the software are being designed so that the designers are daring both government supervisors and manufacturing representation to attempt to extract data in any conceivable manner from an on-line transmission and obtain usable information.

The results of this research are expected by the end of next month.

A.E. Frei, director of Sonic 360 Reservations Systems for Continental Airlines, described, in a presentation of Continental's system, a method of security for data in the on-line environment.

Frei said that each terminal has a unique address which serves as the primary source of data control. The agent's assembly area, a specific data record assigned to each set internally, provides, Frei said, the key link for all data transmission to and from a terminal and is the principal source of system security.

Unique Number

Each agent, Frei explained, is assigned a unique number. Each city on the airline's system has an internal data record containing a list of all the agents in that city and the duty codes each agent can perform.

Each agent comes on duty and must sign in by entering his ID number, his duty code, and his initials. If a match is made, the agent receives an "OK" and the agent is free to operate the system within

California Signs With Ticketron

SACRAMENTO, Calif. — The California State Parks and Recreation Department has signed with Ticketron, Inc., a New York-based ticket reservation service, to handle campsite reservations.

The department had signed with Computicket and had the plan in operation when the company folded in April and it was forced to go back to manual methods.

his limits of responsibility.

The agent's sign-in is stored, and all transactions conducted by that agent are checked against his sign-in.

Company rules state that the agent must sign out if leaving his set, which would prevent him, or anyone else, from using his codes and numbers until another sign-in was made.

Discussion later with both the attendees and the experts seemed to uncover a mutual dissatisfaction with what is being done in on-line security.

While Continental's security system would prevent certain fraud attempts, it would not, it was felt, prevent data theft by line tapping. In his presentation, Frei had pointed out that the value of the data would have to determine the cost determination of the security.

Youth Indicted in Data File Copying

LOUISVILLE, Ky. — A Cincinnati youth was indicted by the Grand Jury here on charges of transmission of "stolen properties interstate by wire, radio, or television" for alleged unauthorized access on a time-sharing network.

Steven M. Coffman, 18, was arrested in July by agents of the Federal Bureau of Investigation [CW, July 29] acting on a complaint filed by South Central Bell Telephone in behalf of its Louisville customer, Metridata Computing, Inc., a T/S firm.

According to the FBI, Coffman allegedly seized a long line leased to Metridata and then, using Metridata code numbers and passwords, extracted data from the records of Metridata and some of the firm's customers using a telephone and a teletypewriter in his employer's offices.

Coffman was arrested after FBI surveillance and after several telephone long-line traces linked the "unauthorized" use of Metridata Computing's system to a firm at which he was employed.

FBI agents said that Coffman was very close to completely bypassing Metridata's security programs when he was apprehended.

Coffman was arraigned in Louisville in the U.S. District Court for the Western District of Kentucky, at which time he entered a plea of not guilty.

The defendant requested, and received, a change of venue from Louisville to Cincinnati.

A spokesman for the U.S. Attorney's office in Louisville said that the government plans to contest the change of venue.

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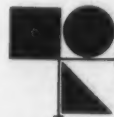
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L.A. Vote Count Succeeds, Loose Chads Still Problem

By Phyllis Huggins

CW West Coast Bureau

LOS ANGELES — An extraordinary effort was put forth by Los Angeles County, representing one-third of the vote of California, more than 7,000 precincts and the largest vote group in the country, to have a smooth-running computerized election.

Controversy and trouble had plagued its Votomatic punched card vote system ever since its first use two and one-half years ago.

But hard work, extreme care and intense scrutiny to detail paid off — the election count ran as smooth as silk.

Bone-weary election officials, hired consultants and political observers beamed with relief.

But what was gained by this accomplishment? No cost savings, although that is its most loudly touted virtue. Official figures for the cost of the election are not in but they range from estimates of \$3.5 million to \$5.1 million. Ray Lee, registrar of voters, said the election costs \$2.3 million or \$1 per voter, but outside experts vehemently dispute his estimate.

Before costs are broken down in several departments, it will be

a month or more.

Speed in the vote count is another touted virtue. Election experts say that under the old manual methods they had snap tallies by 10 p.m. and rarely was an election board on the job after 2 a.m. In the meantime there had been several snap tallies available to the press and people in the neighborhood.

The California polls close at 8 p.m. and even with helicopters and speeding sheriff cars used for this election it took at least an hour to get them to the counting center.

Then the votes had to be processed and the count got off to a slow start about 10 p.m. And

that was just a few precincts, not a representative sampling of all of them.

To get around this annoying delay this time, the TV networks pooled their money and got approval to have key precincts hand counted at the polls so that they could have early returns for their computerized predictions.

As far as the neighborhoods knowing how their particular precincts voted, they had to wait until the computers printed out totals by precinct — anywhere from 36 hours or more after the election. This is important to political workers who want to know how their efforts turned out. The last tapes were put on the computers at 7 a.m. and

experts said this is no improvement over earlier methods.

With all the smoothness and checks and double checks there is still controversy about the vote count. It is believed that all possibilities for fraud have now been safeguarded against here, but the prepunched vote cards are still a crucial problem.

In each case where there is a dented or partially punched out chad, election people will decide whether the voter meant to punch the chad out all the way as rough cards can cause jamming of the card readers. The reaction would seem to conclude that the voter meant to vote, and punch out the chad.

But Les Rivers, chairman of

the Democratic Campaign Committee summed up this process: "Any time a judgment factor gets involved in the vote, it's a bad system."

Although the problem of loosened chads is solved as well as possible before the cards reach the machines, cards jam at an appalling rate. Ten cards in one card reader jammed in the first 10 minutes of the count.

While this reporter was watching, the jamming rate was similar. This helps slow the card readers from an advertised rate of 500 card/min to about 150 card/min. Cards that jam are put aside and duplicated after the regular count has been processed.

'Mystery Hole' Reappears in Detroit Vote

(Continued from Page 1)

Edwards is implying, according to some sources, that the manual removal of the chad, causing the "mystery hole," is a deliberate act designed to squelch, once and for all, computerized voting in the city.

Who spread the information that that specific hole would reject the card hasn't been made clear. The program was to be kept secret by the city until after the election when both parties could then have it checked.

Others feel that the punch was made by the voters by accident, that the instructions for voting for or against a proposition on returning the troops from Vietnam were so confusing that the voters made the punch in the wrong spot.

A third faction believes that the ballot card did not properly fit into the Votomatic punch device causing the vote cast by the voter to punch out a chad in the wrong space. If that were the case, this faction believes, then possibly the whole vote is in error.

Persons holding this view feel that their suspicion could be easily verified. M20, they feel, could really be a misplaced "no" vote for proposition E. The misplaced vote would cause the card to be rejected, and thereby noticed.

A parallel misplaced vote at M5

would not be rejected by the program, however, and the card would be processed and counted, with the "no" vote cast for that proposition completely ignored in the count as if the voter had skipped that proposition.

Later, with the count not even begun in two of the centers, Edwards was quoted as saying that the challenges of the accuracy boards were interfering with the counting process.

In addition, the "borrowed"

A Democratic challenge to Datamedia Computer Service Inc., the program supplier, took two hours to resolve. Datamedia personnel were advising Michigan Consolidated programmers on how to make corrections on the computers, the challenger said.

After the resolution of the challenge, one of the IBM computers in the Michigan Consolidated center went down, and the count program was held up further until repairs could be completed.

Edwards, in explaining what went wrong to the city council, said he had "serious reservations" that the city's election staff had the ability to control a computer election in a city this size.

In a related development, a resolution was passed in the Michigan State House two days after the election to determine ways to obtain laws that would prohibit the use of computers in future Michigan elections.

One Michigan lawmaker told CW: "It is the American vote those people are playing around with. This country is about the only place left in the world where a man's vote can really mean something. Something has to be done to make sure that precious vote means more than just a hole in any handy piece of cardboard."

A Rainy Day in Flint

CW Midwest Bureau

FLINT, Mich. — Even though county clerk George G. Dunn and Computerized Election Systems Inc. (CES) profited by the experience of their successful punched card August primary, there wasn't much they could do about the weather for this general election.

Heavy and persistent rain threw a wet blanket on the election, dousing Dunn's hopes for a final tabulation of 180,000 votes by 1 a.m.

Punched cards not actually doused by dripping wet voters swelled in the dampness and delayed the count. The final tabulation wasn't reached, according to a spokesman at the DP counting center of the intermediate school office, until after 11 a.m., 10 hours later than Dunn's expectations.

At first, according to a spokesman, card readers were adjusted to take the "thicker" punched cards. When that didn't work, forced drying was tried. One source claimed they baked some of the cards in the school's cafeteria ovens — 15 minutes at 350°. Forced drying, the spokesman said, however, just buckled the cards causing another problem, reader jamming.

Natural drying and duplication, where required, finally got the count process running.

tion.

The first reports on the delays in getting the final count were explained by Edwards: "It took more time than I had anticipated getting absentee ballots counted at the polls."

computer centers were taken away from their election chores as the press of daily business meant the lenders—two banks and a gas company—had to use their own computers for their own work.

Afips Hoping for 20,000 Fall Conference Attendees

(Continued from Page 1)

downturn, Afips officials were quick to point out that last fall's Las Vegas affair had doubled the figures from the previous conference in Boston, and that such growth could not continue forever, especially in the current economic environment.

UCC's young president, Sam Wyly, delivered the keynote last spring, and called for development of the data communications industry, using microwave transmission facilities such as the ones he could sell.

Communications Topics

Wyly's clarion call has been taken seriously, as a considerable portion of the technical program has been given to the communications aspects. Several papers, plus a half-day panel on Wednesday afternoon, are devoted to this discipline.

This year's keynote will be delivered by H. Ross Perot, the philanthropist/patriot/businessman of Electronic Data Systems, who is scheduled to discuss the theme of this year's FJCC, "Systems and Society."

Many of the exhibitors will be showing OEM products, including Control Data Corp. which cancelled its exhibit last spring but was unable to recover its deposit. The fee was reportedly applied to the fall bill, however.

IBM will show two of its newest computers for the first time in public (except for "press" unveilings).

The new System/7 process control computer will be simulating a test of electronic components in a stand-alone mode, a company spokesman reported.

The 370/155, among other tasks, will be performing six user jobs in a "typical job mix," the

company stated, using five languages (PL/I, Cobol, Fortran, Algol, and Assembler) under OS/MVT, and teleprocessing under OS/Btam.

Afips has been able to exceed its goal of allocating 10% of the space to "new faces." At last count, over 30% of the exhibitors would be showing for the first time, or returning after an extended absence.

In addition to the exhibits, there will be 26 technical sessions, nine of which will include panel discussions. There will also be a six-session composite, entitled "Broad Perspective," during which industry experts will informally address the following topics: people in computing; pitfalls; data base management; LSI; multiprogramming state-of-the-art; and performance analysis.

These sessions will not be re-

produced in the conference proceedings. The composite begins with "Pitfalls" at 12:30 Wednesday, continues with "Data Base Management for the Uninitiated" at 2:30, then resumes with the other four topics on Thursday.

The long-range weather forecast calls for temperatures "below the normal range" of 51°-72°, with some precipitation likely. A spokesman for the National Weather Service advised that a "dual purpose raincoat" which could also be used as a topcoat would be suitable for outer wear.

Late figures indicated over 10,000 people had reserved over 6,200 rooms, and the numbers are expected to grow significantly as opening day nears. With only 2,000 preregistrants, however, the aim of reducing last-minute lines was probably lost.

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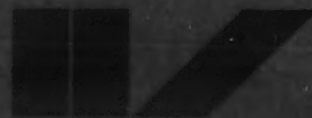
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Privacy Commission Chairman Suggests Licensing Plan

CW Midwest Bureau

CHICAGO — Witnesses appeared before the 15-member Illinois Data Information Systems Commission here recently to assist the commission in its study of ways to counteract unrestricted computer analysis that could violate the privacy rights of the citizen.

Allocating responsibility to safeguard privacy squarely on the shoulders of programmers and analysts, Sen. John Lanigan (R-Chicago), chairman of the commission, said that one of the results of the study could be a proposal to license analysts and programmers.

"A check could be provided by establishing a code of ethics which, if breached, could be

grounds for taking the license away.

"Licensing," he said, "could also be helpful in passing on a person's qualifications for a computer job."

Harry L. Sweatt, director of planning for Honeywell, testified that users have not asked for built-in safeguards.

"Manufacturers," he told the commission, "are more concerned about privacy than any other industry because it is the computer itself, and not who is using it, that gets the black eye."

"Manufacturers Concerned"

Sweatt told the commission that licensing of computer personnel would be "a cop-out. . . . That's the lowest priority."

One witness, an author of books on the subject, told the commission that computers offer great potential for efficiency, but that "they also present the gravest threat of invasion of our innermost thoughts and actions."

The witness, Dr. Jerry M. Rosenberg, a New York psychotherapist, consultant, and author, said at a public seminar that giant computers are displacing widely dispersed files on American individuals.

Rosenberg claimed that computer manufacturers have "shirked their responsibility" by not developing built-in safeguards against information leakage.

"The public has the right to

know," Rosenberg said, "who will have the power to control the computers, and most importantly, how confidentiality and individual privacy can and will be protected."

Norman J. Ream, described by the commission as a New York management services executive, stated to the commission that the establishment of large gov-

ernmental and intergovernmental data banks would not necessarily infringe on the citizen's rights of individual privacy but would rather promote greater governmental economy through efficiency.

Chairman Lanigan said that the commission will hold additional hearings before the General Assembly in March.

Oklahoma Senate Awaits Study on DP Feasibility

CW Midwest Bureau

OKLAHOMA CITY — The University of Oklahoma is presently conducting a feasibility

study on whether the state legislature should use computers, according to the office of state Senate president pro tempore Finis Smith.

A portion of the legislative use would be, according to the senator's office, the taping of Oklahoma statutes. A contract was let to the Aspen Co. for the tapes, but the senator has been quoted as saying that the tapes were not usable for the legislature due to inaccuracies.

The senator has asked the state's attorney general for a determination as to whether or not the state should file a breach of contract suit against Aspen Company.

According to Rob Gee, Senate administrative assistant to Smith, there has been no decision from the attorney general.

While the final report on the feasibility study has not been received from the university, Gee feels that the report will indicate the advisability of computer use by the state legislature.

No comment was available from officials of the Aspen Co. regarding the possibility of suit.

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AMPEX

Ampex at Fall Joint Computer Conference, November 17, 18, 19, Astrohall, Houston, Booth 3013

Stanford Keeps Track of Bugs

PALO ALTO, Calif. — Since the beginning of this month a computer has been keeping track of the germs at Stanford University's research hospital.

Information from laboratory tests is fed into the computer which determines whether the test needs repeating, keeps track of which antibiotics are successful against different types of bugs, and helps doctors prescribe medication.

Laboratory tests have been known to be influenced by human error, Stanford researchers said, and the computer system will provide better quality control and reliability. The results will be "improved diagnosis, timelier treatment, and far less medical paper work."

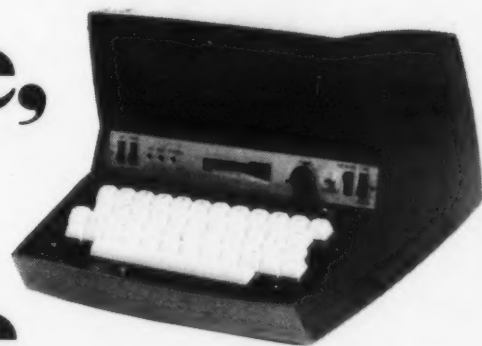
Computers on the Scene

CHICAGO, Ill. — Computers have arrived on the scene to aid professors struggling to meet the publish or perish compulsion. An Illinois professor ran 2,155 lines of Shakespeare's sonnets through a computer which produced 24 pages of analysis.

Among the findings: Shakespeare used 3,211 different words in the sonnets; 136 of these are "monosyllabic function words"; 'couldst' is used once, 'and' is used 490 times, and 54.93% of all words are monosyllabic functions words.

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VIP Head Sees Switch To Services in Decade

By A CW Staff Writer

RICHMOND, Va. — The time is ripe for "a complete reversal of emphasis from hardware to services," according to Joan M. Van Horn, president of VIP Systems Corp.

"Computers have been oversold," Miss Van Horn told CW. "Companies are finally becoming result oriented. Management is no longer interested in new hardware for its own sake; they want to know what they can get out of it."

Contending that the future of data processing lies in effective computer power rather than just running computers, Miss Van Horn noted: "In the future this may mean the use of computer services rather than an in-house computer, or a mix of the two."

The service bureau head also predicted the imminent blossoming of the information processing utility. "Other computer service operations will tend to combine, merge, affiliate, or franchise with these nationwide communications oriented services. And the impact on other segments of the computer industry will be profound."

Miss Van Horn estimated that hardware consumes 80% to 85% of DP budgets presently, while software accounts for 10% to 15%, and services 5%.

Complete Reversal

"In the next 10 years you are going to see a complete reversal of this ranking," she went on. "Services are going to become the major segment of the industry, representing well over 50% of the purchasing dollar. Second will be software and third will be hardware."

"This shift will be caused by the shift to the external use of

computer power through the computer utility and away from internal, in-house computer usage."

Economies of scale constitute one of the main reasons for the turn to information processing utilities, Miss Van Horn noted. She also said that a utility may be able to provide faster turnaround time than the in-house DP center.

"In other words, the comptroller of a small company may be better able to get a special management report on demand from the information processing utility than from his own computer center, which is heavily scheduled for maximum cost effectiveness, but has no flexibility for special management demands."

Marketplace Change

The structure of the DP marketplace will change, too, Miss Van Horn forecast, as mainframe manufacturers cease dealing with end-users and the utilities take up the role of data processing retailers.

Corollary to this prediction, Miss Van Horn said that IBM's market dominance will disappear, and it will become "one of perhaps five major computer vendors, each having between 15% and 30% of the market."

"We will see the information utility moving from numeric and word processing to on-line pictorial processing within the next decade," she said.

Concerning the threat of misuse of data banks, Miss Van Horn said: "I think that by the end of this decade we will have lost a great many of our fears and dismissed a great many of our hobgoblins concerning such notions as data banks, invasion of privacy, and Big Brother."

Study of Centers Details Ineffective DP Utilization

(Continued from Page 1)

primary purpose of providing faster and better information;

- EDP managers, by virtue of their analytical training and understanding of the business through information systems becoming the general managers of their enterprises.

The study also showed that in the average center only 48% of available computer time is used productively, based on the computers' utilization only 64% of the available time and not round the clock.

In addition, 25% of the manned hours are wasted in the average center.

He said that 42% of the companies do not maintain accurate records of computer performance. This makes effective analysis of inefficiency most difficult.

Because of technical advantages, firms using multiprogramming achieve higher production.

Schroeder concluded that the "findings of this study suggest

that the EDP manager of the '70s must become a much more effective manager of the resources with which he is entrusted.

"This study indicates the total burden of excess computing capacity in the U.S. is nearly \$3.5 billion. Elimination of idle time and reruns would increase throughput about 20% and reduce costs by about \$1.2 billion per year.

"Elimination of unmanned hours would provide a 75% increase in computer throughput. This is equivalent to about \$2.25 billion in computer rental per year.

"These projections do not even consider the improvements which can result through use of available technology in the equipment now installed. The wave of criticism, of both computers and those who work with them, seems to be in some ways justified.

"The status of the EDP manager is best characterized by one word — opportunity," he said.

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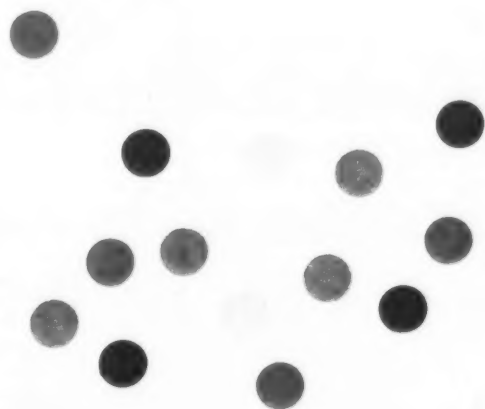
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Editorials

Back to the Drawing Board

A computerized vote counting system should provide three things: reliability, economy, and speed.

Punch card voting, in at least three major cities, flunked out again last Tuesday.

Considering the importance of elections, and acknowledging the need for a faster system than paper ballots and a cheaper system than currently available voting machines, it seems to us that development of a really good computerized voting system should be undertaken at once.

Perhaps ideally the project should be funded by a foundation and undertaken by a university. The system could then be licensed to private companies which could charge lower prices because they would have no development costs to recover.

The current mess is doing neither the public nor the computer industry any good.



'I'll Decide Who's a Professional'

Letters to the Editor

'Solutions Looking for Problems'

Regarding the article [CW, Oct. 21] on library automation, [The U.S. Office of Education] USOE and Lamkin are embarked on a fruitful but difficult mission analogous to development of an SST.

One can design a Mach 2 aircraft on the drawing board. But getting it to fly successfully with a payload requires advances in physical and chemical metallurgy, fabrication techniques, machine tooling, construction methods and transfusions of impressive amounts of capital with a payout only dimly, if at all, evident financially; some would say sharply less evident sociologically.

Libraries, as repositories of knowledge, are beginning to find technology hastening to meet them on their ground and within their economic framework as advances in COM, MIC, communications technology, micropublishing, audio-video techniques, terabit data bases coupled with increasingly cost-effective computational methods and processors come to their assistance.

Wouldn't it be nice if our country and its people generally felt that broadening the horizons of educational opportunity and utility was an exciting kind of Mach 2 "trip"?

Salesmen are "solutions looking for problems" and their concerted efforts assist materially in the cross fertilization and interdisciplinary methods which we (who are working in areas of Lamkin's beanpatch), look for in obtaining forward-looking and cost-effective implementations.

Librarians are, by necessity, frugal with scarce resources. Their austere environment is excellent for the evolution of value-engineered systems and hardware.

Continuing exposure by CW in this area will assist in the gentle conversion of "library" types to "our" types — and even vice-versa...

Cedric Sheerer, Consultant

Los Altos, Calif.

University Did Not Sell Computer Time to Candidate

Your Sept. 30 issue carries an article entitled "Mass. Primary Sees Two Candidates Use Computers," which includes the statement that computer services used in the primary campaign of Rev. Robert F. Drinan were "...rented from MIT."

The statements are in error; computer services used in Father Drinan's campaign were not obtained from MIT. MIT's policies do not permit the sale or use of our computer facilities on behalf of candidates for public office.

Robert H. Scott, Director
Information Processing Services

MIT
Cambridge, Mass.

Confusion apparently arose from a statement by candidate Drinan regarding the consultant company, a founder of which is also a lecturer at MIT. The computers contracted for the work were reportedly those of two local firms. Ed.

Comment on IBM Marketing

An article in a recent *New York Times* indicated that Thomas Watson, on his visit to the Soviet Union, found there was a difference in marketing approach between the IBM Corp.'s approach and that of the Soviet Union. It was not indicated what the difference might be.

It appears that the difference is that IBM believes in an IBM monopoly of the computer market within a country and the Soviet Union believes in a state monopoly and control of the computer market within its country.

The IBM way seems to work within the U.S.

Thomas E. Doyle
Vice-President

George S. McLaughlin Assoc., Inc.
Summit, N.J.

Response/360 Prices Corrected

Thank you for publishing your article on our Response/360 Informd package [CW, Oct. 14].

The price you quoted for our Response/360 service is really for our Response I service. The correct Response/360 prices are: \$9/hr for connect time, 30 cent/sec for CPU time, and \$1/mo/3,440 characters of storage.

Everett R. Daly
Product Manager

Response
Leasco Time-Sharing
Washington, D.C.

How You Can Locate Salvage Company

A number of readers have inquired how they can locate a salvage company interested in buying their discarded punched cards and printouts.

Since printing a national list of salvage companies is impractical, we suggest that persons interested in selling their waste paper look in the classified telephone directory under "Paper Stock — Waste" and under "Waste Paper."

Companies listed under these categories will either make arrangements to pick up waste paper or will be able to advise where such a service can be obtained locally. Ed.

What's New in the Fed? This Firm Has the Data

WASHINGTON, D.C. — The Center for Political Research (CPR), a two-year-old firm, uses a computer to tell its clients what's going on in the Federal Government. "We're sort of bookkeepers of what's happening in the government," said President Anthony C. Stout.

CPR Research Services, one of two divisions within the company, has created the largest computer file in the world on incumbent congressman and their constituents, according to Stout.

D.C. Data-Line

By

Alan Drattell



The data bank collected serves as the nucleus for several statistical routines.

For example, a set of up to 100 different characteristics is maintained for each congressional district (CD) in each state.

These characteristics, or predictor variables, are correlated with congressional roll call data through the application of statistical routines. The results are used to analyze congressional voting behavior.

In the 10th CD in Indiana, for instance, the computer has noted the following: the largest city in the district is Muncie, with 68,603 people; 36.8% of the population are white collar workers; 70.3% of the residents own their own homes, with a median value of \$9,930; the biggest industry is the manufacture of durable goods.

The computer also indicated in fiscal year 1968, the Department of Defense spent nearly \$60 million in the district; and President Nixon received 50.5% of the vote in the 1968 election. The voting record of the district's congressional representative is given by name, date and vote cast.

Normally, by analyzing pre-

vious votes of individual congressmen, CPR is able to come up with a prediction of how these representatives will vote on future legislation. "Lobbyists, big corporations and others are interested in such information," Stout added.

CPR is also analyzing what Stout called "deviant voting." He explained: "The computer can give us clues, for example, to why a man may have suddenly voted a certain way when his prior voting record shows a completely different pattern on similar bills."

"We have a listing of all corporations and unions in a congressman's district, for instance, and we might find that his vote could have been influenced by certain types of companies or unions located in the CD."

The company utilizes an IBM 360/67 at National CSS, Inc., a service bureau in Stamford, Conn. Its link is a Datel teletype-writer terminal in CPR's Washington office. Software for the project was done by Mathematics of Princeton, N.J.

"All of our information was previously on System Development Corp.'s time-sharing system in Washington," Stout related. "SDC lost a great deal of money on its operation and they closed down about April 1."

"We had to pull back, reprogram our project and find a place to hang it. SDC did give us limited access to its California machine until June 1. On June 15, we went on the air with National CSS."

The file contains approximately 19 million characters of data. "Nobody," added Stout, "ever put Congress' votes in a computer and accessed them before."

Input to the system is from various sources, including CPR designated state political desks that the company maintains. Data comes from periodicals, newspapers in the states, plus the 70 CPR correspondents throughout the nation. Update varies and is currently about once every two months.

The Question Arises: Who Will Control DP Problems?

The computer area has been hit by many failures in the past years. More than likely you may have brushed them off as being

comparatively unimportant, when contrasted with the great successes.

However, it seems that this perhaps necessary ability existing inside the industry to brush off the failures is being quickly dissipated outside the industry

as the computer applications widen, and touch more nearly the rest of the population.

In particular, the voting fiascos are stirring legislatures to action. One of the country's most active legislatures (remember what it did in the antipollution field when no one believed that cars would ever be controlled) is the California one, based in Sacramento.

Recently, the California Senate passed a resolution about this area which states quite clearly that it intends to do something. And, where California is concerned, we are dealing with a state that is quite capable, and competent to really take action in this matter.

Subsequent to the resolution being passed I received a letter from the consultant to the Senate committee concerned. I would like to share this letter with you, without any further comment.

I think that this may be extremely important, and I would like to suggest that when you have read it you contact Mr. Cathcart, or myself and let us know what you think.

The only action which has so far been taken, incidentally, is that a hearing on the licensing of computer programmers, and operators was called for January. Here then is the letter:

A committee hearing to consider Senate Resolution 240, relative to computer operators, [and] chaired by Sen. Alfred H. Song, [is expected to be held in January]. All interested persons who wish to testify are requested to notify the undersigned as soon as possible so that they may be included in the agenda.

A broad staff study preparatory to this hearing has revealed that computer program and output can have massive effects. Both individuals and society at large may incur serious injury because of faulty programming, generally with little recourse, because our legal system is geared to non-computer technology.

Many computer programs involve extremely sensitive areas involving the privacy of individuals and the security of company records, with few legal sanctions

against unauthorized use of computer output now in existence.

Little, if anything, is available today to insure responsibility on the programmers and software companies.

The quality of training schools ranges from poor to good, but it is difficult to determine objectively because there are no standards for testing the competency of the graduates.

In fact, there does not appear to be any recognized definition of a computer programmer.

A clear need exists for major modifications in criminal and tort law to accommodate computer technology, and in the area of regulatory law with which this committee is most concerned.

There is an equally clear need

for establishing standards and means of insuring that these are met by programmers, software companies, and training schools.

The committee will be exploring to what extent the state should be involved in the establishment of standards for the data processing industry. The committee naturally invites your comments relative to this hearing before the hearing date.

James A. Cathcart, Consultant

Senate Committee on
Business and Professions
Room 2044
State Capitol
Sacramento, Calif. 95814

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The Taylor Report

By

Alan Taylor, CDP



Song's Senate Resolution 240

Whereas, The electronic computer has become one of the most important tools in modern business and government; and

Whereas, Public confidence in the reliability of the electronic computer has been severely impaired by failures during the counting of ballots in several counties after the recent primary election; and

Whereas, Neither the electronic computer business nor the professional competence of its technicians is subject to any regulation whatsoever; and

Whereas, It is in the public interest that electronic computers be operated and maintained in such manner as will merit confidence in their accuracy; now, therefore, be it

Resolved by the Senate of the State of California, That the Senate Committee on Rules is hereby requested to assign to an appropriate committee for study the subject of licensing and regulating the electronic computer industry and electronic computer technicians; and be it further

Resolved, That such committee report its findings and recommendations to the Senate on the date specified by the Rules Committee upon assignment of this resolution.

Letters to the Editor

Reader Seeks Support For Post-Processor

Alan Taylor has spotlighted some of the problems with the implementation of the Cobol language. The problems of Cobol should be kept in the spotlight and not brushed aside as "little inefficiencies." These little inefficiencies become "computer eaters" when they are generated into the hundreds of subroutines that make up a single system.

In particular, I wish to address the IBM ANS Cobol compiler. We have studied some of the compiler output and are convinced significant improvements can be made.

We have approached our IBM representatives about optimizing the output of the ANS Cobol compiler and they responded that an indication of general interest was necessary in order to consider it. IBM users, let's make our needs known!

As Alan Taylor points out, a new compiler would take too long. As an alternate proposal what about a compiler post-processor? A post-processor has several advantages over a new compiler.

- A post-processor would probably be available sooner than a revamped compiler. Modifying a compiler is typically a long complicated process.

- The compiler would not require more core since the post-processor would be a separate job step. This would make optimization possible for

more users with smaller machines.

- We would not have to consider sacrificing any language specifications to achieve optimization and, therefore, the post-processor would be more generally usable.

- The user would select optimization only when he felt it was the most advantageous.

Since optimization could be relatively expensive, the user might not find it desirable during the testing phase or for one-time programs.

IBM Cobol users, please contact me at Aetna Life & Casualty, 151 Farmington Ave., Hartford, Conn. 06115, so that we can push for a solution.

Judy Packer, Administrator
Language Research,
CDP Support

Aetna Life & Casualty
Hartford, Conn.

Teach Programmers How to Write Programs

The Cobol efficiency series by Alan Taylor has resulted in some interesting replies from CW subscribers. I think the problem was neatly summarized in the first paragraph of your letter from my former associate and long-time friend and Fortran programmer, Newell Usher [CW, Sept. 2].

If Cobol is selected, we should be sure that our programmer can write an efficient Cobol program. Assigning an auditor to

redo a poorly written program will result in a "kludge."

In addition, I would recommend selecting the auditor from the defensive line of the Minnesota Vikings and assigning him a food taster.

If we are getting Cobol programs which require only the changing of a "few statements" to make them efficient, it's probably because our programmers aren't aware of what is and is not efficient. They need a course in Cobol statement efficiency.

This will include the machine language resulting from selected Cobol statements and combinations of statements. This should bring the point home even if the programmer can't read machine language.

Often the problem is more serious. Unless the program is well designed and built, no one, including an auditor, can make it efficient, only a little more efficient. The solution is to teach the programmers how to write programs. Don't confuse this with learning how to form Cobol statements.

Programmers should be taught how to design and build programs to suit a purpose. This is where much of the efficiency is now lost. And it is independent of language.

Paul P. Clement Jr.
Product Planning Manager

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NSF Awards Stanford \$154,000 Retraining Grant

PALO ALTO, Calif. — Although the computer industry is hard-hit by the slowing economy, it is still considered the fastest to recover from the recession and the one with the best job expectancy.

For this reason the National Science Foundation has awarded

a \$154,000 retraining grant to Stanford University in cooperation with the Palo Alto Employment Clearing House, a non-profit organization, to retrain 15 unemployed technical people to give them M.S. degrees in information sciences. This is a pilot program that may be initiated in

other locations.

The 15 will receive tuition, some fees and \$541 a month. All applicants had to meet Stanford's requirements for masters work, and also had to meet the NSF requirement that they were mid-career people — at least five years out of school.

Ages of those in the program range from 32 to 48 and some of them already hold masters or doctorates in other lines.

Eric Peterson, vice-president and treasurer of the employment clearinghouse and immediate past president of the ACM Bay Area chapter, said the "holders of two degrees will have the best chance. It is also of significance that the information sciences field is considered the strongest long-range employment field."

Jobless Picket Wema

PALO ALTO, Calif. — A circle of unemployed technical people, most of them middle-aged, picketed the Western Electronic Manufacturer's Association (Wema) semiannual workshop meeting here where Robert Finch, adviser to the President, was dinner speaker.

Their signs said such things as "Don't fight inflation with our jobs," "Hardcore employed professionals," "More money for medical electronics."

They were representatives of Self Help, an organization working out of a local church where they have been given office space. The group seeks to aid each other in the job search

West Coast Wrapup

problem.

At a press conference prior to the dinner meeting, Finch fielded questions about the job and economic situation. He said the unemployed technical people were bright people and in view of their training have many options besides engineering.

He also acknowledged that it might be two to six years before the lag in research and development in non-defense areas can absorb all the technical job force.

On the subject of defense spending, Finch stated that cuts have bottomed out. "We've cut \$8 billion in two years. That is going to the bone. If it is cut further it will make us a second- or third-rate power."

When questioned as to how the research lag can ever be taken up when there is so little spending being done, he commented: "We were caught in that all our defense companies and think tanks had to be defense oriented. All procedures were locked into defense-oriented spending and you don't change that overnight."

License Hearings Set

SACRAMENTO — How much the public and the taxpayer are

being harmed because of lack of professional standards in the computer industry is the problem being considered by California State Sen. Alfred Song, (D-Monterey Park) in hearings to be held by his committee on business and profession.

The committee will look into the need for licensing of programmers and operators. Original impetus for the study was due to errors occurring in California computerized vote counts. As Jim Cathcart, consultant to the committee said: "If we continue to have computer errors in the vote count it will undermine the whole system of elected government."

'Public Interest'

Cathcart explained: "When a programmer makes an error or intentionally jams a program, the cost can be phenomenally expensive. We've got to look into the public interest."

People already scheduled to testify at the hearings in January include Dr. Walter Carlson, president of ACM, Dr. Willis Ware, head of the computer sciences department at Rand Corp., top officials of Afips and DPMA, representatives of the computer manufacturers, and consultants.

California is the first state to take up the problem of licensing in this industry. Those interested in attending the hearings or in testifying should contact Sen. Alfred Song, Room 2044, State Capital, Sacramento, Calif. 95814.

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November 11, 1970

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Capex Cobol F Optimizer Cuts Object Programs 30%

PHOENIX, Ariz. — With the Optimizer package now available from Capex Corp., OS/360 users can reduce Cobol F object program size by an average of 30%, and use the core saved to speed execution of the program, or run additional programs.

Capex said that a version of Optimizer is also being developed for ANS Cobol.

The package reduces CPU time by stripping the compiler-generated code that does not apply to the program being optimized. Further, Capex said that Optimizer cuts execution time of I/O-bound programs by generating extra I/O buffers and/or by allowing the OS chained scheduling capability, which reduces channel and wait time, to be activated.

Optimizer is transparent to the

user. No changes in the Cobol source code are required and no changes have to be made to the operating system. The package can be used under any of the OS options, including PCP, MFT or MVT.

Capex explained that Optimizer reduces the size of an object program by minimizing register loads, address constants and perform linkage code. Capex emphasized that Optimizer cannot improve programmer logic; it can only strip unnecessary code instructions generated by the programmer's source statements.

To operate, Optimizer requires a region of 128K bytes or a region as large as the object program, whichever is larger, and direct access storage for temporary work files. The package will optimize single object program

modules up to 512K bytes in size.

Execution time of the Optimizer process is generally less than 50% of the compilation time, according to Capex, but varies depending on the structure of the object program being optimized and the CPU on which the optimizing is being

done.

The program listing generated from Optimizer includes the object code, in optimized form, interleaved with the source statements that generated it, for ease of debugging. The system also provides a report highlighting any problems encountered, and unresolved, by the Optimizer.

The Optimizer for OS/360 Cobol F costs \$15,000 plus \$1,000/yr for maintenance after the first year. The company also noted that the ANS Cobol version, when ready, would be available to users of the Cobol F Optimizer at reduced cost.

Capex Corp. is at 2613 North Third Street.

RCA's Guaranteed Software Conversion Contract Seen As Real Benefit To User

BOSTON — RCA's guaranteed software conversion contract can be of very real benefit to the user, according to several software houses that have already done their own in-house conversions from DOS/360 to RCA Tape Disk Operating System (TDOS).

Under RCA's conversion plan, current DOS users of IBM 360/30s, 40s and 50s would be guaranteed successful conversion support to the RCA 2, 3, 6 or 7, for a negotiated fixed price based on complexity of the programs.

Cullinane Corp. anticipates that RCA should have little trouble in the instruction/procedure sections of the converted

programs. Somewhat more trouble, but still nothing serious, may occur in the environment section of Cobol conversions. The most problems will show up in the distinctly different Job Control Language (JCL) required under the IBM and RCA operating systems, the company said.

Informatics agreed that the operating system interfacing is the most significant problem. An awareness of the functional differences between the IBM and the RCA access methods is even more important than the differences in the JCLs, Informatics said.

Applied Data Research reiterated the importance of the

operating system interface problems and wondered whether RCA could in fact provide enough two-way expertise to successfully convert highly complex programs. ADR admitted, however, that RCA could undoubtedly handle "run-of-the-mill" programs, and that this would be good enough to serve the needs of most users.

RCA probably can write a special program to convert IBM's Cobol assignment clauses into RCA acceptable format, Cullinane surmised. In the procedure division, there are few enough discrepancies between IBM and RCA verbs so that a short checklist would serve to spot those that need re-coding.

NSF Project Sells T/S Programs For \$1 Apiece

BELOIT, Wis. — Time-sharing programs covering a wide range of topics are available at token costs, through a project funded by a National Science Foundation Grant, and Beloit College.

The Social Sciences Instructional Project (SSIP) has acquired programs from many sources and adapted them to a time-sharing mode. The programs cover areas as diverse as accounting, psychology and operations research.

Most are written in Fortran IV for easy implementation on many CPUs, including, thus far, the IBM 1800 and 1130, CDC 6400 and Burroughs 5500 processors.

The programs presently available include a terminal version of a financial simulation package, with new options, and a large interactive world politics simulation game. Others are said to provide practice in elementary probability and experimental methods for psychology students.

Those interested in operations research can use Simqu which simulates the behavior of queues or waiting lines under a wide variety of assumptions concerning distribution of arrival and service time.

Probability and Statistics programs include one that generates up to 250 random numbers from a normally distributed "population" with mean and variance chosen by the user. Others include adaptations of IBM's Scientific subroutines Tab1 and Tab2, which tabulate the actual and the percentage frequencies of data over equal class intervals.

The Anvar program provides general analysis of variance, and Mrcap is said to perform multiple regression, correlation, analysis of residuals and least square predictions.

Single copies of the specifications of these and the other programs in the SSIP library are available without charge. Complete listing of any specific program is available for \$1, while punched card decks for each program are priced at \$1 plus postage.

One or more programs will be copied onto a single magnetic tape for \$5. To take advantage of this option, the user must provide a 800 bit/in., 9-track tape.

The Social Sciences Instructional Project is under the Department of Economics and Business at Beloit College, here.

Basic and APL Available on TSR

NEW YORK — Time Sharing Resources (TSR) has added Call/360 capabilities to its service and, as a result, the user has a choice of APL or an enhanced version of Basic on the same network.

TSR noted that Call/360 also supports PL/I and Fortran IV, giving users more flexibility of language. Restating his feeling that APL is an ideal time-sharing language, a TSR spokesman said that users still want or need other options. The Call/360 implementation seemed the best way to provide them, he added.

In addition to expanding the choice of languages on its service, TSR has recently added a remote job entry capability, permitting data entry and analysis from terminals at speeds up to 2400 bits/sec.

TSR users are charged \$11/hr of connect time and \$6/min CPU time, with one minute CPU free for every connect hour. The storage rate is \$1.50 for every 7200 characters. There is no minimum charge.

TSR has its offices at 22 West 48th Street.

Firm Plans Organic Compound Data Base

CLEVELAND — A tape-oriented database describing approximately 15,000 organic compounds will be available next summer, according to the developer, Science Databank Inc. (SDB).

The Codab/Orchem data base uses the table of physical constants of organic compounds from the Handbook of Chemistry and Physics, plus related material. The data base is organized sequentially, based on the handbook compound number. Records for each compound

include digitized representations of the infrared, ultraviolet and nuclear magnetic residue curves, the Chemical Abstracts Register number and the Wiswesser Line Notation. Each compound has a 'directory' entry which defines the records in detail, SDB said.

The company said the data base would allow the user to get specific information on a given compound or to determine all compounds with a given characteristic. Relationships between properties, and between properties and structural characteristics

can also be extracted from the file, the company said.

About to be tested on a prototype basis, the data base is expected to be available in either Ebcidic or Ascii format, on 9-track 800 bits/in. magnetic tape.

It will cost \$60/mo for the first installation, on a three-year lease. SDB said that the data base may also be made available through a time-sharing service.

Science Databank Inc. is at 18901 Cranwood Parkway.

VIP Text Editing Available as Service, Package

WASHINGTON, D.C. — Large-scale installations and others with special needs to keep all their processing in-house can buy or lease a text-editing package, previously available only as a time-sharing service, from VIP Systems Corp.

VIP said that VIPcom '71 is an enhanced version of the IBM Administrative Terminals System (ATS/360), containing more than 100 modifications and extensions of the standard IBM-supplied package.

The company said that many of the changes improve the reliability and eliminate errors which exist in the IBM software. Others provide usage statistics and improve data center operations, including the monitoring of communications facilities.

Another series of changes provide extended capabilities for the terminal users, including on-line, remote batch and photo-composition features. VIPcom '71 is a stand-alone system that

is capable of producing "type-writer" formatted reports on the user's in-house high-speed printer.

The packages also include an interface with VIP's photocomposition services, which are not included in the software being made available now. The photocomposition services utilize Photon equipment to produce proportionally-spaced type set reports.

Written in BAL, VIPcom '71 has been implemented under DOS/360 and could be used on other processors that support BAL. The system requires at least 48K bytes of storage, the company said.

Purchase price for VIPcom '71 under a license agreement is \$25,000 plus \$500/mo for maintenance. Rental is \$2,495/mo with credit towards purchase.

On a time-sharing basis, VIPcom '71 capabilities are available for \$2.50/hr of connect time, with no charge for CPU time.

Charges for printing and storing of data vary with the user's needs, the company said.

VIP has local lines available in Boston, Chicago, Cleveland, Los Angeles, Philadelphia, San Francisco and through its Washington, D.C. headquarters at 1145 19th St., N.W.

Book Provides Conversion Tables for 360 Programmers

NEW YORK — A small book published by Programming Science Corp. (PSC) allows 360 programmers to find hexadecimal and decimal conversion values from 0000 to FFFF in hexadecimal and from 0 to 65,535 in decimal, directly.

The use of the Hex Conversion Tables requires no addition or subtraction to arrive at conversion values. With direct conversion values, the Hex Conversion Tables book sells for \$3.

Programming Science Corp. is at 5 E. 42nd St.

T/S Service Includes Financial Analysis for Planners

RICHMOND, Va. — Corporate planners can use a Financial Analysis System, now available on the Action/APL time-sharing 'network', to study historic data, to develop projections from historic data and/or forecast future situations.

Regardless of the method of analysis followed, the planner is not required to have any understanding of programming to generate his reports, according to network spokesmen.

The reports include spread sheet, a percentage spread sheet and a spread sheet trend analysis. Funds flow and cash flow reports are also possible, as are ratios and ratio analyses. A reconciliation of equity completes the report series.

While more than 80 line items are programmed, the user may change any and all the line titles to suit his special requirements.

Once historical data has been entered, it

may be altered to reflect changes, but otherwise will be retained and available to re-use as often as the user wishes.

According to Action/APL, the system will flag any improperly balanced columns and will assist in the audit phase of the analysis.

Network spokesmen noted that only through the use of APL as the source language were they able to make the analysis system as flexible as it is. Other languages are too restricted, they added.

The Action/APL 'network' is national in scope and is a cooperative effort of four APL-oriented companies: The Com-

puter Company, here; APL Services, Inc., New York; Computer Innovations, Chicago; and Proprietary Computer Systems, Inc. Van Nuys, Calif.

When the network was organized [CW, Aug. 26], spokesmen noted that a nationwide price schedule would "probably" be developed in time. For the moment, however, prices for the service vary from region to region.

Proprietary Computer Systems is at 16555 Saticoy St., Van Nuys, Calif., while Computer Innovations is at 10225 South Western Ave., Chicago.

The Computer Company is at Seventh and Franklin.

Service Firm Adds Two Offices

ATLANTA, Ga. — Lykes-Youngstown Computer Services Corp., (LYCSC) has opened operating centers in Dallas and Houston, Texas.

The firm furnishes commercial data processing services and offers proprietary software packages and custom programs. The Dallas center initially will be offering a newly developed stock broker account-

ing package in cooperation with two other Dallas firms, Affiliated Computer Systems, Inc., and The BVR Corp.

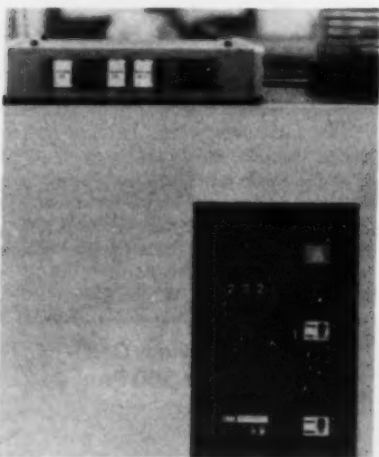
Other LYCSC centers are in Atlanta, Cleveland, New Orleans and Tampa.

Lykes-Youngstown Computer Services Corp. is headquartered at 1447 Peachtree St. N.E., here.

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AI/Com Adds Advanced Circuit Design Capability to Network

PRINCETON, N.J. — Match, a circuit design program, is available via the AI/Com Time Sharing Service of Applied Logic Corporation. Developed by Applicon, Inc., Burlington, Mass., Match is said to offer features not generally available in any other program for design of circuits employing filters, passive networks and operational amplifiers.

Optimization, the program's most unique feature, allows engineers to automatically vary the circuit parameters to improve their designs.

Other Match innovations are: ability to perform group delay calculations; convenient simulation of component tracking; frequency and impedance scaling; Smith chart and expanded Smith chart plotting; tables for entering empirical frequency responses; tables for entering rational functional data; capability to

analyze very large cascade circuits.

Match also can calculate the signal transfer ratios of circuits with Z, Y, G, H, ABCD and scattering parameters.

Engineers can plot up to 10 curves on a single graph, notebook size. All results may also be output in tabular form. Engineers can choose their output in single precision (five significant figures) or double precision (ten significant figures).

There is no initiation fee, but, after three months on the network, there is a \$100 minimum monthly billing. Charges are accrued at \$10/hr for connect time and ten cent/"core unit," a concept based on amount of core storage, time and I/O accesses used.

Applied Logic Corp. is headquartered at 1 Palmer Square.

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November 11, 1970

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Westinghouse 2500 Is General-Purpose Minicomputer

By Frank Piasta
CW Staff Writer

ORLANDO, Fla. — The list of available 16-bit minicomputers has been extended with the addition of the first of a new line of small CPUs from Westinghouse.

The general-purpose Westinghouse 2500, based on the company's Prodac and other process control units, is intended to appeal to users for industrial, communications, and scientific applications.

The 2500 resembles several other currently available or recently announced minis in both price and performance. The cycle time of 850 nsec compares favorably with the faster avail-

able minis. The recently announced Data General Nova 800, for example, will have a cycle time of 800 nsec, while the PDP-11/15 is scheduled to be increased in speed to 890 nsec next April. The leader in speed in this price range, though, is the Varian 620/f with a cycle time of 750 nsec.

From a price point of view, the Westinghouse unit, at \$9,950, is somewhat higher than the approximately \$7,000 price of the PDP-11/15 and Nova 800.

The 2500 does, however, include as standard equipment features that are extra-cost options on some competitive machines. These include double-precision

arithmetic and hardware multiply and divide.

The 2500 seems to be unusually well adapted to use in data acquisition, communications and real-time process control environments through its I/O system. As many as 128 direct I/O channels and 62 buffered I/O chan-

nels are available. Up to 120 external interrupts are available in groups of eight. Direct memory access is also available.

Peripherals include teletype-writers, paper tape, punched card, magnetic tape, line printer, fixed and movable head disks, CRT display, contact closure

controllers, and analog I/O systems.

Software for the 2500 is based on that developed for use with the company's P 2000 units and is compatible with that system.

First deliveries of the Westinghouse 2500 are scheduled for the second quarter of 1971.

Low-Cost A.B. Dick Desk-Top Device Makes Hard Copies From CRT Display

CHICAGO — Priced at one-third to one-half of similar units, the A.B. Dick direct image desk-top copier makes hard copies

from a CRT display.

Interfaceable to 75% to 80% of current displays, according to the company, the Model 9750 Display Copier can be used for both alphanumeric and graphic output.

The copier can be remotely operated by locating print control at the CRT station, making it practical for several stations to share a single copier.

The unit produces dry copies by an electrostatic process. Copying speed is 12 seconds for the first copy and eight seconds for successive copies.

Paper handling capacity of the copier is one 460-foot roll. The unit can also hold a 350-foot roll of master paper for offset reproduction.

Standard image size is 8-1/2 in. by 8-1/2 in. A unit that can produce 10-1/2 in. by 15 in. copies is available on special order.

The standard copier is furnished with an industrial grade nine-inch CRT monitor. The monitor accepts EIA standard video signals for 525-line black-and-white television systems. The unit is also available without the monitor.

The copier is priced at \$2,660 in the standard version. Without the built-in monitor, the unit is priced at \$1,980. Both versions are currently available on a 15-day delivery schedule.

A.B. Dick Co. is at 5700 W. Touhy Ave.

\$60/mo Bunker-Ramo 2210 CRT Terminal Has Numeric Keys, 200 Character Screen

STAMFORD, Conn. — The third member of Bunker-Ramo's 2200 series of CRT terminals is the lowest price unit in the family. The device rents for less than \$60/mo.

Called the BR-2210, the terminal features a 200 character CRT and block alphabetic and numeric keyboards.

It is compatible, the company said, with the IBM 360, Burroughs B500, Honeywell Series 200, and Univac 490 and 1108 systems. Software compatibility is achieved with modifications with the terminals.

The low price of the 2210, the company said, is a result of basing the display on the company's widely used Telequote III terminals.

The terminal is designed to be used either as a remote terminal or directly on-line to a computer. Transmission rates over telephone lines is at 2,400 bit/sec. On a direct wired system, data can be transmitted at speeds up to 55,000 bit/sec.

Operating features necessary for on-line data entry and retrieval have been incorporated. These include protected format, variable layout, tab, skip, dial, and conversational mode.

The basic unit has a lease price of \$39/mo and a purchase price of \$650. A typical installation, the company said, consisting of a terminal and communications and control units, buffered and interfaced to a System 360, would rent for about \$55/mo.

First shipments are scheduled for December 1, 1970.



Bunker-Ramo 2210 CRT

Thin-Film Circuit May Replace Mechanical Card Reader Sensors

PRINCETON, N.J. — A thin-film experimental circuit that could be used to replace at lower cost the mechanical or photocell sensors in punched card readers has been developed by RCA labs.

The circuit, laid out like a crossword puzzle, is a form of integrated circuit 5,000 times larger than the standard type, according to RCA. It is a flat array of 960 photosensitive elements, plus auxiliary components and interconnections, deposited on a four-by-eight-inch plate of glass.

Because the array is an integrated circuit fabricated on a single substrate, RCA said, the circuit could be used in card readers that are smaller and less expensive than conventional units, many of which are assembled from large numbers of separate photocells.

In its present form, the circuit is laid out as a computer card reader containing 960 photoconductive elements — 12 rows of 80 elements — that match the 960 positions on a computer card. Wherever a hole has been

punched in a card, the corresponding photoconductive element senses light and, in turn, provides an electronic signal.

STAMFORD, Conn. — A low-priced portable communications terminal from Data Products Corp.'s Telecommunications Division produces hard-copy output.

Output of the PortaCom terminal is on 8-1/2 in. paper, in contrast with the strip printer that is used in other portable terminals.

In spite of the greater weight of the printing mechanism, the unit weighs less than 30 lbs, according to the company, and fits into an attache case.

The PortaCom, the company said, is currently being used in a variety of applications including

computer instruction, banking, sales, medical information systems, and engineering.

The printer produces up to three carbon copies using sprocket-fed paper. The unit has a built-in acoustic coupler that can transmit or receive at up to 300 bit/sec.

The terminal uses a standard 128-character Ascii keyboard and is Teletype-compatible. It is also designed to interface with tape cassettes through an EIA 22-pin connector.

The PortaCom leases for \$95/mo and sells for \$2,450. Quantity discounts are available. The unit is currently available on a 30-day delivery schedule.

The Telecommunications Division of Data Products Corp. is at 17 Amelia Place.



PortaCom Terminal

Graphic Time-Share Plotter Works With Terminals

PALO ALTO, Calif. — Graphical output in conjunction with an IBM Communication Termi-

nal is obtained with a new graphic plotter from Hewlett-Packard. The Model 7201A is an abso-

lute coordinate plotter that develops graphics by drawing vectors or plotting points.

Backup software or previous programming knowledge is not required for operation, the company said, and it accepts coded data at 14.8 char/sec.

IBM-Compatible

The plotter adds IBM terminal compatibility to the Hewlett-Packard graphic plotters. The 7200A accepts standard Ascii code at 10 char/sec.

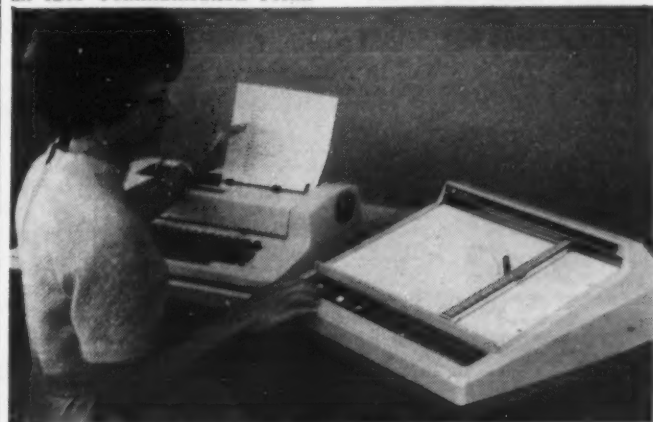
An operator can input data or mathematical functions in source language on time share systems to produce charts, or graphs. Mnemonic codes similar to those used in time share systems are used to instruct the

plotter.

All points are defined by absolute coordinate pairs so each plotted point is independent of the accuracy of preceding points. Improper data causes the pen to lift; plotting is resumed automatically at the next properly formatted point.

Paper up to 11 by 17 inches is gripped by the Autogrip electrostatic paper hold-down. Front panel controls allow adjustment of graph limits to fit a plot to any preprinted grid. Several colors of ink are available in disposable pens.

The price of the HP Model 7201A Graphic Plotter is \$3300. Rent/lease plans are available. Deliveries are scheduled to start in 8 months.



HP Model 7201A Graphic Time-Share Plotter

Cartrifile Tape Cartridge Transport Uses Revised Data Recording Format

MOUNTAIN VIEW, Calif. — An upgraded version of the Cartrifile magnetic tape cartridge transport for minicomputers uses a revised data recording format to increase cartridge capacity and to improve data transfer rates. The device can interface with minicomputers from DEC, Data General, and Hewlett-Packard.

Called the Model 4196, the unit features four tape loops, each with its own transport, that can hold over 3 million data bits. The system can hold more than 1-1/4 million 8-bit words when a 1,000 word record format is

used.

The four tape transports in the unit are independently controlled by circuitry that allows the computer to write data on one tape while reading from another. This capability, the company said, expands the minicomputer into a true data processing system that is able to sort, match, merge, and separate data, with only one Cartrifile required.

A transfer rate of 18,000 bit/sec enables the Cartrifile 4196 to transfer 16-bit computer words at a rate of 1,000/sec. The rate for 8-bit words is 1,800/sec.

The 4196 uses bi-track data format, a bit-serial, phase-encoded recording technique. The bi-track format uses only the two center tracks of the tape, which, the company said, eliminates the possibility of data errors due to edge-track damage.

The Cartrifile 4196 is available complete with interface circuitry and software for use with small computers such as the PDP-8, Nova, HP 2114, 2115, 2116, and others. Cabling and necessary electronics are provided.

The Cartrifile 4196 tape system is priced at \$6,050, fully equipped. It is currently avail-



Model 4196 Cartrifile Tape System

able on a 45-day delivery schedule. Tri-Data Corp. is at 800 Maude Ave.

Improved Version of XDS Mini Features Faster Cycle Times

EL SEGUNDO, Calif. — XDS has unveiled an improved version of its CF16 mini.

Varying from its year-old predecessor in having a faster memory, the CF16A in other ways is compatible with its predecessor.

The use of more advanced technology enables the newer model to have a cycle time of 1.6 μ sec, as opposed to the 2.67 μ sec time of the older device.

Designed for applications in industrial, educational and aerospace environments, the 16-bit mini features a 126-instruction set, memory that can be expanded from 4K to 32K words, I/O transfer rates as high as 500K word/sec, and a variety of peripherals.

Software includes an assembler, basic Fortran compiler that can operate in 4K, utility and diagnostic programs, and a library of math routines.

Peripheral equipment available includes fixed-head disk storage, magnetic tape, punched card input, punched paper tape equipment, analog/digital converters, and communications interfaces.

A typical 8K CF16A configuration, according to XDS, with real-time clock, three levels of priority interrupt, memory and power protect, paper tape reader/punch controller, and teletypewriter will sell for approximately \$17,000. The first units are scheduled for delivery in November, 1970.

Varian Text-Setter Faster Than MT/ST

IRVINE, Calif. — Output of camera-ready text at the rate of 200 pages-per-hour — 20 times faster than presently used systems — is claimed for an automated text-setting system from Varian Data Machines.

Varian said the system, called Varitext, cuts revision time 90% as compared with IBM MT/ST systems. Varitext combines digital tape transports using Philips-type cassettes, a line printer to produce revised drafts, and a Varian 620/i minicomputer to automate all operations.

Typical Varitext systems will lease from \$2,000 monthly, depending on configuration and number of terminals. Deliveries are scheduled for early next year.

Video Systems' Recorder Uses Philips Cassettes

PENNSAUKEN, N.J. — A cassette tape memory recorder from Video Systems Corp. is adaptable to any of the firm's CRT terminals.

Called the VST-Termicord, the recorder can be plugged directly into any of the Video Systems units. It is designed to use Philips-type C-60 cassettes.

Data is recorded and reproduced at 500 bit/sec. Packing density is 250 bit/in. Up to 850,000 bits can be stored on a cassette.

The Termicord is priced at \$1,695 and can be leased for \$85/mo on a one-year lease.

Video Systems Corp. is at 7300 N. Crescent Blvd.

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EverOn Supplies Power for Computer

SANTA ANA, Calif. — The EverOn Power Processing Unit, from Gates Learjet Corp., Static Power Division, "precludes brownouts" and their effects on

The price of the systems range from \$13,500 to \$102,000. Delivery is about five months, the company said.

Cyberex, Inc. is at 4399 Industrial Parkway.

700C System Can Use Diesel Generator

RICHMOND, Va. — A system from Power Systems and Controls, Inc. provides five minutes of continuous power after the normal supply has failed.

Called the Series 700C, the equipment is designed to prevent "brownouts."

A diesel-driven generator can be added to the system to provide continuous power in case of longer periods of failure.

The systems are priced from \$30,000 for a 40 KVA unit to \$500,000 for systems rated at 1,500 KVA.

Power Systems and Controls, Inc. is at 3206 Lanvale Ave.

'Energy Package' Can Be Leased

FAIRFIELD, N.J. — Airoyal Manufacturing Co. offers auxiliary power systems that can provide computer power for periods of time from 15 minutes to one hour.

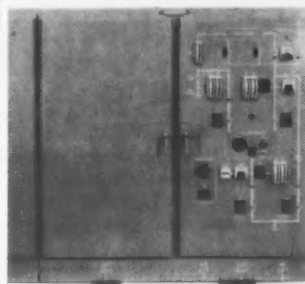
For longer time periods, a diesel generator can be added to the Airoyal Continuous Energy

Package.

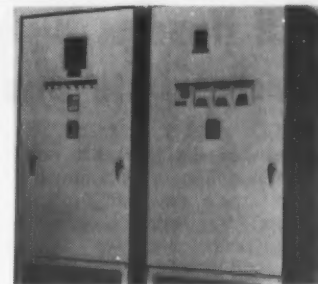
The smallest unit, rated at 10 KVA, is priced at \$30,000. The largest, with a rating of 500 KVA carries a price of \$500,000.

The units are available on a lease basis also.

Airoyal Manufacturing is at 19 Gloria Lane.



Gates EverOn for 360/50



Cyberex System

dp accessories

computers. The device regulates commercial electrical power.

The basic configuration can also supply a computer with power for up to five minutes. With extra batteries the unit can supply auxiliary power for a longer time.

The price of the basic unit is \$30,000. A five-year lease which includes maintenance is \$890/mo. Delivery is 120 days.

Gates Learjet Corp., Static Power Division, is at 2001 South Ritchey.

Systems Supply 1 Hr. Back Up Power

WILLOUGHBY, Ohio — Five standard protection periods, ranging from one minute to one hour are available with various models of back-up power devices from Cyberex, Inc.

Called the Fourth Generation Static Interruptible AC Power Systems for Computers, the systems are available in 40 standard ratings from 10 to 120 KVA.

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CAMBRIDGE COMPUTER ASSOCIATES, INC.

OCR Handles High Volume Input, Punches Data Directly In Cards

PALO ALTO, Calif. — Intended for the user that processes a minimum of 9,000 invoices per day, an optical scanner from Data Recognition Corp. reads imprinted documents and punches the data into tab cards.

The Model 710, the company said, was developed for use in the bank credit card industry, the retail store trade, hospitals and the oil industry.

Capable of processing up to 6,000 documents per hour, the machine can be used to replace keypunching. It is a stand-alone device requiring no computer control.

The IBM device most nearly comparable to the Model 710, Data Recognition said, is the 1282 optical reader punch. Less

expensive, this IBM device reads only numeric data and three special characters from 51-column and 80-column cards and punches the data into the same cards at a maximum rate of 200 card/min.

The Model 710 uses the company's optics and recognition technology that were developed for its Model 700 OCR-to-microfilm unit.

The new device reads Farrington 7B font, commonly used in credit card and similar applications. Output is through a standard 100 card/min punch.

First deliveries are expected to be made in June, 1971.

The price of the Model 710 is expected to be about \$85,000.

Data Recognition is at 908 Industrial Ave.



Gerber System 1223

Gerber Digital Drafting System Includes Text Symbol Generator

SOUTH WINDSOR, Conn. — An all-digital drafting system, manufactured by Gerber Scientific Instrument Co. uses a Hewlett-Packard mini as a control device.

The System 1223 has a wide range of capabilities, the company said, permitting the conversion of all types of data into graphic form.

The system is said to be suited for both office and field use. It consists of a general purpose Model 1200 stored program control, an interface for matching the computer output to the Series 23 drafting table, computer peripheral devices for data transfer, and software for directing operation of the system.

An additional feature is a symbol generator which utilizes

core-stored alphanumeric text symbols and allows full rotation of text messages, Gerber said.

The system features a 400 char/sec punched paper tape bi-directional reader, a 10-1/2-in. spooler, and a standard I/O teletypewriter for manual input and operator message output. Magnetic tape input is also available as an option.

It has applications in such areas as space vehicle tracking, intelligence data display, map making, statistical analysis, logic diagrams, schematics, logistics, and aircraft and missile design.

The System 1223, in its basic configuration, is priced at \$80,000. It is available on a three to four month schedule.

Gerber Scientific Instrument Co. is at 83 Gerber Rd.

According to our calculations, there are 12 reasons why you should visit Booth 3516 at the FJCC.

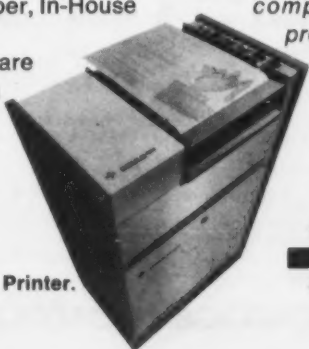
Here they are:

- New Gould 4800T Programmed Remote Printing Terminal — remote batch printing terminal with extensive on-line and off-line printing capabilities.
- New Stand-Alone Printer/Plotter System — on-line to a minicomputer.
- New IBM-Compatible Off-Line Printer/Plotter System — makes hard copies of alphanumerics and/or graphics at page-per-second rates.
- New Brush 1100 Graphic Plotter — a high performance digital X-Y plotter for remote time sharing computer terminals.
- New Gould Memory Discs — disc manufacturing and measuring.
- New 11" Wide Printer/Plotter — prints in 132 columns.
- New Program Controlled Paper Cutter/Stacker.
- New Low Cost Matte Paper, In-House Paper Coating.
- New Hardware and Software Character Generators—a

new software package permits computer generation of standard or non-standard characters, symbols, etc.

- New Hardware and Software Interfaces — permit on-line printing from major mainframe computers such as IBM 360; DEC PDP/8's, 12's, 15's; Interdata; Burroughs; Univac 1108; Varian, etc.
- New Software Packages for Graphics — Mainframe-compatible plotter Conversion, Quick Draw, and Design software packages now available from Gould.
- New Test Boxes for Printer/Plotter Electronics.

We're looking forward to seeing you at the FJCC November 17 thru 19 — Booth 3516. Ask us about our new prices and pricing policy. And if you can't make the Conference, write for complete details on our new products. Graphics Division, Gould Inc., 3631 Perkins Ave., Cleveland, O. 44114.



One of the reasons:
The Gould 4800 Electrostatic Printer.

 **GOULD**

Printer and Card Reader Added to Qantel System

HAYWARD, Calif. — A medium speed line printer and a compact card reader have been introduced for use with the Qantel V business computer by Qantel Corp.

The line printer will handle Qantel V data at the rate of 200 line/min. It will sell for \$11,500 outright or lease for \$355 a month including maintenance.

The card reader is fully buffered and will read standard 80-column width Hollerith coded cards. It translates data into Ascii code. The price of the card reader is \$3,950. It will lease for \$122 a month including maintenance.

The Qantel V system is a business accounting center which can also operate as an intelligent terminal in a computer network environment. The addition of the new printer and card reader are said to add flexibility and usefulness to the system.

Qantel is at 3474 Investment Blvd.

Channel Allows PDP-10 To Use PDP-11 Front-End

BEDFORD, Mass. — A device that allows a DEC PDP-11 mini to be used as a front-end processor for the PDP-10 time-sharing system has been developed by Bedford Associates, Inc.

Called the Data Channel, the unit provides bi-directional programmed data transfers between the 16-bit PDP-11 and the 36-bit PDP-10.

According to the company, the device could find use in such applications as communications processing and data concentration. It could, for example, be used to set up an automatic data gathering system in manufacturing plants to process data for an MIS.

Transfer rate for 16-bit words is 850K bit/sec, while 32 or 36 bit words can be transferred at 1,500K bit/sec.

The channel is so designed, the company said, that the PDP-10 controls the operation of the channel. The PDP-11 can request data to be transferred, however.

The device offers program selection of the following transfer modes: interrupt, non-interrupt, and half-word (16 bits). A display panel provides read-out of channel states.

The Data Channel is priced at \$9,800. It is currently available on a 30-day delivery schedule.

Bedford Associates is at 75 Wiggins Ave.

Tape Handling

HOUSTON — A punched paper tape handling system has been introduced by Houston Scientific Industries, Inc.

The system, known as the Autotape-3, is designed to be mounted directly on the ASR-33 Teletype.

The company is at 4202 Directors Row.

AT & T Calls Johnson Biased, Asks Disqualification

By Don Leavitt
CW Staff Writer

NEW YORK — American Telephone and Telegraph Company has asked Federal Communications Commissioner Nicholas Johnson to disqualify himself from participating in FCC matters involving Bell System companies.

In a "petition for disqualifica-

tion" addressed to the Commissioner, AT&T characterized remarks Johnson made on Oct. 19

Communications

in Chicago as demonstrating "a deep-seated bias and prejudice against the Bell System."

The Johnson speech, delivered at the Digitronic User's Association meeting, [CW, Oct. 28] was subtitled "For Whom Does Bell Toil." During the talk, Johnson commented that "Bell management has been urging policies that don't even serve the company's interest."

"Not atypical of a basic AT&T failing," Johnson said, is the situation in New York which "serves to illustrate the long lead times in the AT&T system. Lower cost planned expansion was replaced by high cost crash programs. Many customers went unserved."

He said that in the past few years, "we have seen an increasing erosion of the privacy and integrity of the telephone system." He added that Bell had "no strong opposition" to wire-

tapping, and said that in fact he had heard reports of "local company cooperation with all types of communications interception."

He also cited TD 2 microwave as an example of Bell's lack of technological supremacy. "Competitors," he said, "had jumped ahead in developing this particular type of microwave. Bell had to make a crash effort to catch up. Whether this crash effort would have been successful without Bell's basic monopoly advantages of FCC protection of Bell-maintained barriers to competitive entry cannot be determined," he said.

Later he noted that "some of the most disheartening and fascinating of Bell's management errors" involve the telephone service itself.

AT&T said that the specific accusations and charges Johnson made in his speech were without merit and factually unsupportable. The fact that he volunteered the charges in a public speech, the company said, is entirely incompatible with the dispassionate objectivity required of his high office as a public regulatory official.

Many of the issues raised by Johnson, the company said, are now pending before the FCC in proceedings in which Bell System companies are entitled by law to an impartial and objective determination.

Reacting to the ATT petition, Johnson said that he will consider it "most seriously" and admitted "it is understandable why Bell management would want to silence me."

Bell Admits Demand, Says It Can Meet Data Needs

By Ronald A. Frank
CW Technical News Editor

NEW YORK — Acknowledging an ever increasing demand on the part of computer data users for improved communications facilities, AT&T officials said last week that the Bell System could best meet those needs.

Appearing at a special session held here and transmitted via closed circuit TV to Washington and Chicago, were Richard Hough, president of AT&T Long Lines, Kenneth McKay, vice-president for Engineering, and Samuel Bonsack, vice-president for marketing and services.

Bonsack said that current Bell estimates indicate a total data market worth two billion dollars by 1980. He cautioned, however, that the "demand for data will not outstrip voice [facilities] demand by the end of the 70s."

When asked whether AT&T considered specialized carriers such as MCI, and potentially Datran, as competitors, Bonsack said these type of firms were not yet providing data users with services.

New Hearings Needed

Asked whether Bell would compete when the new carriers began operating, Bonsack said that it must first be proven whether the new carriers "are in the public interest." He called for a new set of hearings by the FCC to determine "the public need." He added that AT&T would "compete aggressively" in the field of data communications with any new carrier.

On the question of price averaging whereby Bell spreads network costs evenly over its entire network, Bonsack said that if the new carriers offer data rates lower than AT&T on the more densely used routes Bell would have to react.

Pressed on this issue he said that AT&T would have to consider lowering its rates on the routes where it had competition. He predicted that such selective lowering of rates could quite possibly result in rate increases on less densely used routes throughout the Bell System. He added that speculation about such modifications in Bell's pricing policies was still premature.

McKay said that today the "average data phone is operating at 2,000 bit/sec and experiencing an error rate of 5 bits in every 10 million bits transmitted."

DAA Maintenance Is Vital

Discussing the interconnection of non-Bell equipment to the phone system, McKay told CW that AT&T would sanction the incorporation of DAA devices within non-Bell equipment only if Bell were able to retain responsibility for the maintenance of the devices.

Speaking of future methods of data transmission, Hough predicted that waveguides would be in use on the Bell System by the late 70s and laser-controlled fiber optic pipes were a possibility for the early 80s.

Penril Unit Can Replace Bell 101C
SILVER SPRING, Md. — The TTY-300 modem designed for installation within a Model 33 Teletype, is a replacement for the Bell 101C, and is available from Penril Data Communications Inc., 960 Thompson Ave., here.

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Technical Sessions Stress Systems Aspect of Theme

HOUSTON — Four-and-twenty subjects, and then some, will be discussed during the technical sessions at next week's Fall Joint Computer Conference here. Most deal with systems, generally, but few talk about the latter part of the slogan "Systems and Society."

With no sessions to compete with H. Ross Perot's keynote address, the opening technical meetings will be at 12:30 Tuesday afternoon. In most cases conflicting meetings do not overlap in discipline or probable interests of attendees.

The Tuesday sessions deal with programming, memory systems, and design, and, as is the case with all other technical meetings, will be held in the Astorhall. The session numbers precede the times.

Session 1 is entitled "A Spectrum of Programming Languages." Panel topics include ways of circumventing problems discovered in traditional programming practice.

2 — 12:30-2:30 — "Three State-of-the-

Art Memory Systems." Topics are Cache Memory Design, a large MOS/FET Memory, and an on-line mass storage system.

3 — 12:30-2:45 — "Design for Reliability." Papers deal with methods of testing "the newer computer logic [which] is becoming more difficult to test because of added complexity, pin limitations, different failure modes, and newer wear-out phenomena."

4 — 3:15-5:30 — "Operating Systems and Schedules." A panel will review system performance in light of scheduling and allocation strategies, system tuning, and system monitoring.

5 — 3:5-5:30 — "Aerospace Applications," presenting computational devices or techniques in the "typical aerospace industry simulation facility."

6 — 3:15-4:45 — "Survey of Computer Procurement in Research and Development Techniques." Overview of R&D requirements, plus a detailed look at computer contracts.

Wednesday Morning

7 — 8:30-9:30 — "Multi-Access Operating Systems." Describes two relatively small computers which "take on the functional characteristics of much larger machines" when attacking the general-purpose software problem.

8 — 8:30-10:30 — "Analysis of Information Retrieval Systems." Analysis at three possible levels, and the question of protection of information in a resource-sharing environment.

9 — 8:15-10:15 — "Computer-Aided Undergraduate Instruction." Thesis: The educational process is substantially enhanced by (these) methods implemented on computers.

10 — 10-11:30 — "Computer Communications, a Burgeoning Industry, Part I" (Part II is Session 13, after lunch). Establishing computer networks; selection of facilities, based on trade-offs; implementation of computer-controlled

communication networks, hardware and software; interconnecting.

11 — 10:45-12:15 — "Computer-Aided Design." Systems to organize design-aids software and promote its efficient utilization, and an interactive graphics language to assist engineering design.

12 — 10:30-noon — "Interfacing Computers and Education." Following formal presentation of papers, authors review their experiences and reactions in this interdisciplinary field.

Wednesday P.M. Sessions

13 — 2-4:30 — "Computer Communications . . . Part II," panel discussion.

14 — 1-3 — "Time-Sharing Systems." Addresses the use and philosophy of T/S, plus terminals, applications, dedicated systems. Includes panel discussion.

15 — 1-3:30 — "Hybrid Systems." Three papers discuss multiprogramming, the Digital Differential Analyzer, and electronic patching, showing the programming of a complex problem.

16 — 3:30-5:30 — "Simulation Languages and Systems." Three papers, each on a specific language, plus one on simulating traffic control, and the fifth presentation of simulating voice processing.

17 — 3:30-5 — "Art, Vice and Games." The use of computers in "unusual and exotic applications," including music, sculpture, bridge, even crime.

Thursday Morning Sessions

18 — 8:15-9:15 — "Computers and Manufacturing." Two presentations, one dealing with IBM's ideas on process control, the other with testing Western Electric's manufacturing line. Emphasis on real-time speed, test sophistication, and equipment efficiency.

19 — 8:15-9:45 — "Automata and Switching." Statistical coding theory and formal automata theory, as applied to controlling the generation and transmission of data.

20 — 8:15-9:45 — "Computational Efficiency and Performance." Relating costs to accuracy; also disclosure of an efficient technique for analyzing program running time.

21 — 9:30-11:30 — "Long Range Goals of Programming Languages," a panel discussion. Three approaches are reviewed formally: universal language, application-oriented language, and extensible language. Relevant research problems are discussed.

22 — 10-11:30 — "The Effects of Government Requirements on the Computer Industry," or the Government as a customer. Panel discussion, featuring Rep. Jack ("Brooks Bill") Brooks, Dr. H.R.J. Grosch, and Joseph F. Cunningham, Office of Management and Budget, as well as representatives of computer industry and user groups.

23 — 10-11:30 — "Time-Shared Text and Information-Handling." The use of the computer for quick response to human information and text-handling needs.

After Thursday Luncheon

24 — 2-5 — "Communications and On-Line Systems." A survey of evolving problems, examination of new applications, and disclosure of hardware and software developments satisfying real-time demands.

25 — 2-4 — "Selected Computer System Architectures." Three contributions to the idea that software costs and complexity can be decreased by representing certain concepts and structure in hardware.

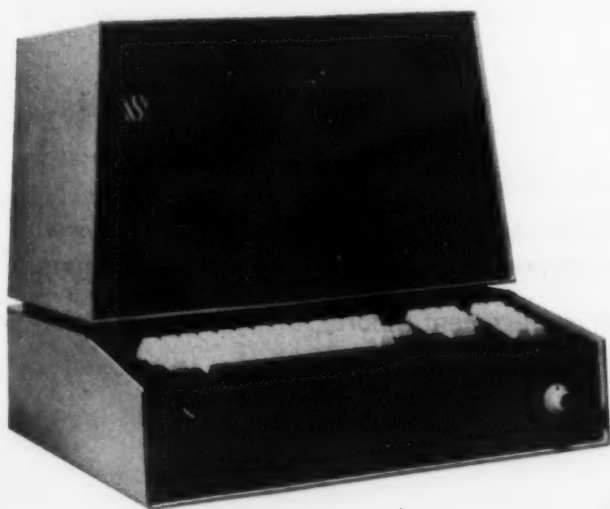
26 — 2-3:30 — "Prospects for Analog-Hybrid Computing." Some predictions on applications, technology, a "tutorial" review, all followed by panel discussion.

The day-and-a-half sessions entitled "Broad Perspective" are described with other news of the conference. They will be presented during most of the sessions on Tuesday and Wednesday.

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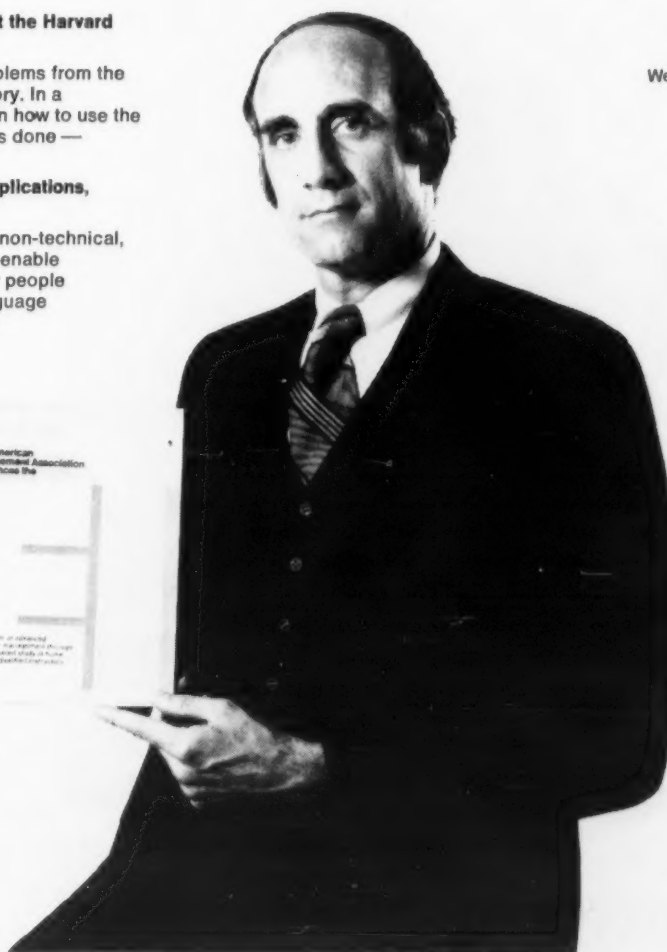
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We have often seen consultants' reports which relate the success of computer utilization to the degree of top management participation in defining the systems requirements. And since the full impact of the computer has yet to be felt on management operations, it is equally important that a thorough understanding of modern management techniques and objectives exists at all levels of management.

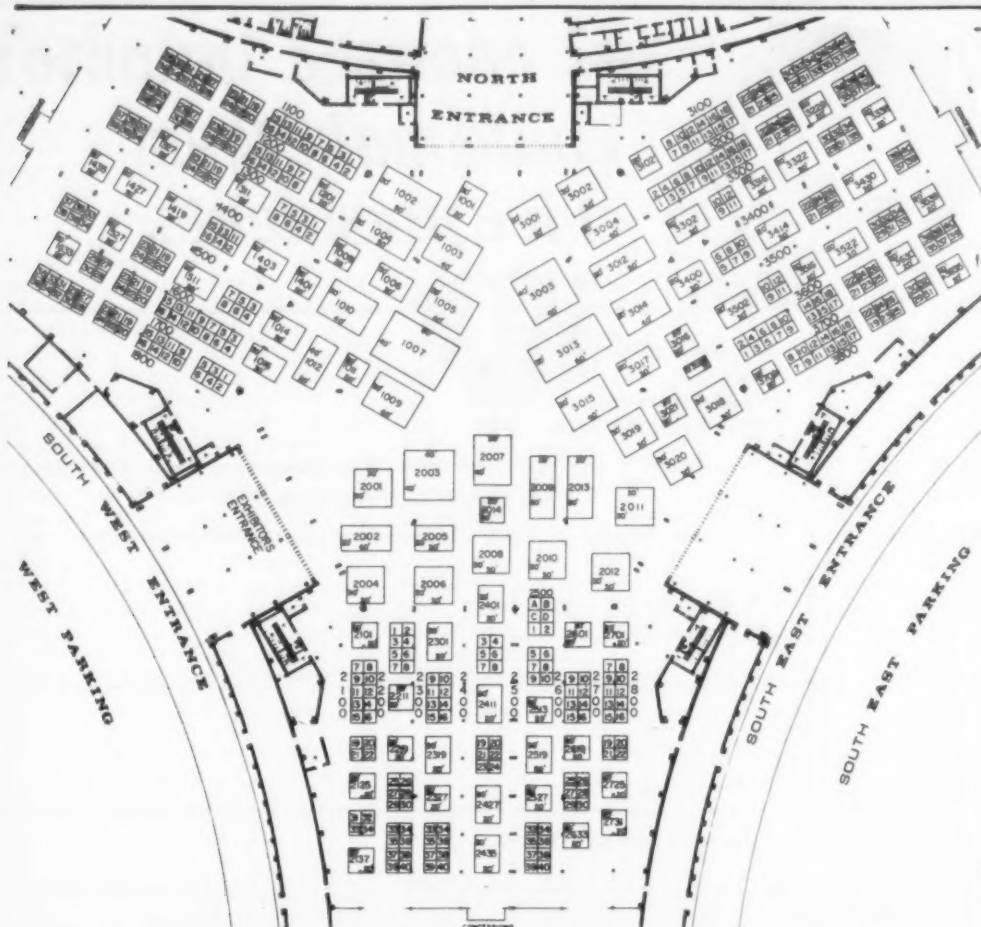
Computerworld is pleased to recommend *Management and the Computer* to its readers as an effective aid in preventing a communications gap between top management and data processing executives.

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COMPUTERWORLD



Wending Your Way Through the Maze

Visitors to this year's Fall Joint Computer Conference will find it a little easier to wend their way to the various booths they intend to visit. Standing at the center of the Astrodome, site of all exhibits and technical sessions, the attendee will see three legs, or sections, emanating. Each leg is a number in a thousand-series,

that is, the Northwest leg is 1,000, Northeast leg is 3,000, and the South leg is 2,000. Furthermore, the aisles are numbered by the walking space, like a city street, and not by the booths, as in previous years. For example, walking down "2400 Street," both 2411 is on the left, and 2412 is on the right.

THE YEAR ENDS HERE

In Computerworld's Special Year-End Review of News and Products Supplement.

We'll be combining our Dec. 30 and Jan. 6 issues into one information-packed year-end supplement issue. And no other computer publication can wrap it all up like *Computerworld*.

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Reserve your own memorable spot in history by calling the *Computerworld* representative nearest you. Closing is Dec. 18.



COMPUTERWORLD
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Extracurricular Activities Include Barbecue, Tours

HOUSTON — A Texas-style barbecue — complete with live entertainment — special tours of the space center, plus walk-through visits to area computer centers comprise some of the extra events being planned for Fall Joint attendees.

The conference luncheon on Thursday will have two features: columnist/humorist Art Buchwald as the main speaker, and the presentation of the Harry Goode Award to Navy Commander Grace M. Hopper.

A science theater and a presentation by the U.S. Department of Commerce on its Global Marketing program round out the organized special events.

The barbecue takes the place of the traditional conference reception, and will be held opening night, Tuesday, Nov. 17, at 6 p.m.

Nasa Tour

Highlighting the special tours will be a trip to the Nasa Manned Spacecraft Center which, according to conference publicity, will emphasize the center's computer capability.

In order to provide maximum opportunity for conference attendees to visit the center, tours will operate from 1 to 5 p.m. Tuesday and from 9 a.m. to 5 p.m. Wednesday and Thursday.

Chartered buses from the Astrodome direct to the Manned Spacecraft Center will be available on a pay-as-you-ride basis.

The Manned Spacecraft Center will hold open house all day, and guides will conduct visitors through the Simulator Lab, Mission Control, the Centrifuge facility, and through several displays.

A special tour will be conducted through the M.D. Anderson Hospital Bio-Mathematics Department at 10 a.m., both Wednesday and Thursday.

Here, attendees may view a computer system used for monitoring life functions during surgery. Open house will be held at the Bio-Math Department from 2 to 4 p.m.

On Wednesday only, tours will be conducted through the IBM Scientific Center, between 10 a.m. and 3:30 p.m. Computer-generated holograms and kinoforms will be shown and holographic applications will be described.

Kinoform lenses, filters and storage devices will also be demonstrated.

Tours through the Texas Transportation Institute will be conducted November 17 and 18. This facility controls traffic on entrance ramps to the Gulf Freeway through the use of sensors buried in the pavement and a system of 14 cameras and an IBM 1800 computer.

Tentatively scheduled is a tour of the recently completed Houston Lighting and Power Energy Control Center which houses dual XDS Sigma 5 computers and associated communications equipment, designed to monitor and control the company's generation, transmission, and distribution systems.

Each day at 2 p.m., a tour to the Houston works of Armco Steel will be conducted. Here, attendees will see a computer-operated, fully automated, rolling mill.

Foreign nationals will need prior clearance to visit the Armco facilities.

Mini May Not Get Emmy But It Reaches TV Audience

LOS ANGELES — While it may never become a star, a minicomputer is receiving some prime time television exposure.

Every other Sunday in KCET's Studio E, a General Automation SPC-12 mini records and displays the results of audience response to controversial questions of the day.

The questions are argued on "The Advocates," a National Educational Television (NET) program presented on alternating Sundays by KCET and WGBH in Boston. Both studios of broadcast origin have an SPC-12 controlled tally system, and a third system is flown around the country to the different cities where remote audiences are gathered each week.

The votes are counted by direct link between the computer and the voting terminals.

Newey Trelegan, manager of the audience response system, explained that the full tally system consists of 100 response terminals, a telephone call-in monitor, the General Automation SPC-12 computer, and a videograph for display of the results.

Trelegan emphasized that "the vote results stored in memory are not just gross breakdowns of

"yea" and "nay," but the individual response of each terminal. This is very typically important for subsequent analysis of the votes.

"Typically," he said, "at the beginning of the program, before the audience has heard the arguments, we identify the question and ask the audience to indicate the opinions they brought into the studio. This vote is stored and after the advocates have completely presented their cases, we take a second vote."

"We display the results of the two votes and indicate the change — not just the gross change such as, '10 more now vote for the affirmative', but the character of the change.

"That is: '15 former nays now vote yea, and five former yeas now vote nay.' And at the same time, of course, we also display how the undecided vote was swayed," Trelegan explained.

Counting the vote and storing the data terminal by terminal is straight forward programming. There are also provisions for storing statistical information about the voter at each terminal. Such factors as political affiliations, race, religion, — or anything that is pertinent to the question can be recorded.

ACM, Other Interested Groups Plan Adjunct Meetings

HOUSTON — Scores of "adjunct meetings" will surround the main event next week, when the fall computer carnival gets under way at the Astorhall.

The parent group, the American Federation of Information Processing Societies (Afiaps), sponsors the conference itself, and several of the constituent societies hold annual, semiannual, or special meetings in the meantime.

The Association for Computing Machinery (ACM), generally regarded as the senior U.S. society, will hold the most meetings, running from Saturday through Friday.

The Special Interest Group on File Description and Translation (SigFidet) will conduct a workshop on data description and access Saturday and Sunday, 9 a.m., to 5 p.m. at Rice University.

Sunday, in Room A in the Astorhall, the Special Interest Group on Computer Graphics (SigGraph), will hold a dinner meeting from 6:30-8:30 p.m.

And Now We Join . . . in Progress

Other activities are listed below, with the exception of some meetings for internal ACM purposes (editors of the group's various publications, or chapter chairmen). Some meetings with meals require prior arrangements, but are nonetheless listed for general information.

All ACM meetings will be in the Marriott Motor Hotel unless otherwise indicated, and room designations precede the time. The phrase "Special Interest" has been omitted in group/committee listings.

Monday, Nov. 16

Computer Science Education (SigCSE), Astroworld Ballroom, A, B, 8 a.m.-10 p.m.

Computer Graphics (SigGraph) workshop, lunch, A, B, C, E, 9 a.m.-5 p.m.

ACM Standards Committee, Rough Rider, 2-7 p.m.

Computer Systems Installation (SigCosim), Audience participation encouraged. Business meeting, planning, d, 8-11 p.m.

Tuesday, Nov. 17

Computers and Physically Handicapped (SigCaph), D, 7:30-10:30 p.m.

Computer Personnel Research (SigCar) review of accomplishments, open discussion, E, 8-11 p.m.

Programming Languages (SigPlan), B, 8 p.m.-midnight.

Wednesday, Nov. 18

Business Data Processing (SigBdp) "Centralization/Decentralization Issue" Meeting, breakfast, D, 7:30-9:30 a.m.

Biomedical Computing (SigBio), E, 4-5 p.m.

Joint Users Group (Jug), Mustang, 4-8 p.m.

University Computing Center (SigUCC), Panel on resource allocations in university computing centers, S. Chapparral, 5-8 p.m.

Operating Systems (SigOps), B, 8-10 p.m.

Language Analysis and Studies in the Humanities (SigLash), Applications in archeology and anthropology, C, 8-11 p.m.

Artificial Intelligence (SigArt), F, 8-11 p.m.

Computer Uses in Education (SigCue), Review of ACM '70 Convention, as regards increasing the role of computers in instruction. Panel discussion, S. Chapparral, 8-11 p.m.

Computers and Society (SigCas) (Jointly sponsored with IEEE and Afiaps), All technical speakers have been invited to sit as a panel in this session. E, 8 p.m.-midnight.

Thursday, Nov. 19

SigBio, continued, F, 8-10 a.m.

SigBio, continued, Rough Rider, 1-3 p.m.

ACM Council, E, 8-11 p.m.

Friday, Nov. 20

ACM Council, D, 9 a.m.-5 p.m.

Systems, Other Societies

The Computer Group of the Institute of Electrical and Electronics Engineers also conducts meetings throughout the joint computer conferences, in addition to other regular get-togethers. The IEEE meetings will all be held at the Shamrock Hilton Hotel.

Monday, Nov. 16

Peripheral Equipment (Technical Committee), Belvedere, 9:30 a.m.-5 p.m.

Fault Tolerant Computing (Technical Committee) Venetian, 8-11 p.m.

Tuesday, Nov. 17

(All Meetings Sponsored by Technical Committee.)

Computers and Communications, Castilian A, 8 a.m.-5 p.m.

Computer Elements, Castilian C, 8 a.m.-5 p.m.

Computer Architecture, Nile, 9 a.m.-noon.

Applications in Management Data, Venetian, 1-3 p.m.

Computer Communications Systems, Belvedere, 1-5 p.m.

Wednesday, Nov. 18

Fellows Committee, Nile, 7:30-11:30 a.m.

Pattern Recognition (Tech. Committee) Castilian A, 9 a.m.-5 p.m.

Midwest Area Committee, Castilian C, 10 a.m.-noon.

Social Implications of Computer Committee, Venetian, 5:30-7:30 p.m.

Thursday, Nov. 19

(Mostly committee meetings, in preparation for the administrative meeting on Friday.) At 9 a.m. Thursday, the following IEEE Computer Group committees will meet, in various rooms: conference and meetings, editorial, technical activities, and membership. At 2 p.m., the executive committee will meet, scheduled to adjourn at 10 p.m.

Friday, Nov. 20

Administrative committee, meeting with luncheon, Belvedere, 9 a.m.-5 p.m.

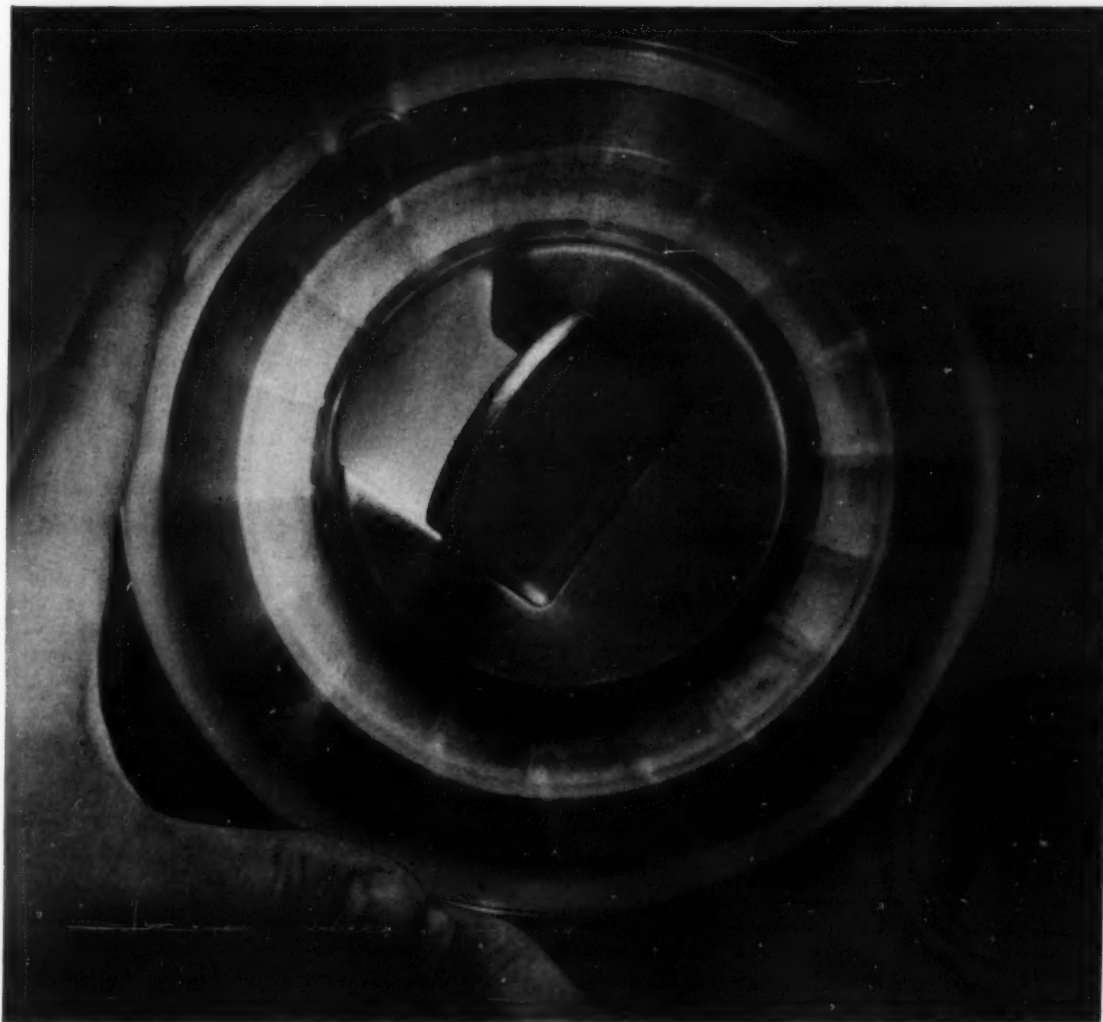
In addition to the numerous meetings listed above, at least two other constituent groups will conduct business during the conference.

The Society for Information Display will hold its Executive Committee Meeting at the Astroworld Hotel Wednesday afternoon, and the board of directors meeting all day Thursday, also at the Astroworld.

Concluding the week's activities for Simulation Councils, Inc. (Sci) will be the Fall National SCI meeting, from 9 a.m. to 3 p.m. at the Shamrock Hilton Hotel. One panel will discuss "Trends in Simulation Computer Hardware," and a second will address the topic of "Trends in Simulations in the Public Interest."

The meeting will include a luncheon.

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The Measure Men.

Many Fine Restaurants on Houston Gastronomy Tour

HOUSTON — The nation's sixth largest city boasts the Manned Spacecraft Center, the "Astrodomain," several cultural events, and scores of excellent dining places.

There are over sixty member restaurants recommended by the Greater Houston Convention and Visitors Council. CW lists several which are located nearest the convention center. Comments by the American Automobile Association follow the general descriptions of restaurants.

The Astrodomain, situated on Kirby St., is the start of all Houston journeys for conference attendees. Heading North on Kirby, there are at least three hotels within sight, all with dining rooms.

As is the case with other restaurants, membership in the "private clubs of Houston" is necessary to partake of alcoholic beverages, where they are offered.

★ First is the *Astroworld*, site of the keynote address. It features three distinct

dining facilities, with champagne dinners and gourmet food, plus a bar. Entertainment is provided in the supper club.

Hours: Coffee Shop, around the clock. Dining Room, 11 a.m. to 11 p.m. Supper Club, 6 p.m. to midnight, to 1 a.m. Sat. Bar, 11:30 a.m. until midnight, until 1 a.m. Sat. (AAA: "Very good") 748-3221.

★ Holiday Inn-Astroworld: *Rhubarb Club* features entertainment nightly. *Dining Room* open 6 a.m. to 7 p.m., 7 days (AAA: "Very good"), 748-1050.

★ Sheraton Inn-Astroworld — two distinct dining facilities, featuring American and Continental cuisine, plus private club with "colorful Texas rodeo atmosphere."

Sierra Room — vibrant Spanish decor, open for dinner.

Conestoga Coffee Shop — wide variety of food, open for breakfast, lunch (AAA: "very good"), 748-3435.

★ Proceeding North on Kirby St., there is a *Steak N' Ale* at 1104 Old Spanish

Trail. This Old English Inn features the "choicest aged beef" served by costumed college students in a rustic atmosphere complete with fireplace, 665-7566. Open from 6:30-11 p.m. Sun.-Thurs., and until midnight Fri. and Sat.

★ Further North on Kirby St., on the corner of South Main, is one of two "*El Chico International*" restaurants, featuring foods of Italy, France, Mexico, and the U.S. The club advertises "popular prices" for dining, and also has a "*Vaquero Club*" which has dining and entertainment. Hours: 11 a.m.-midnight, until 1 a.m. Sat., 666-2288.

"Gastronomical Alley" appears when one turns left onto Main Street. Facing South, there are nine restaurants, some located in hotels, between here and the south loop of the Route 610 beltway.

★ First is *Kaphan's*, which calls itself the "aristocrat" of seafood and steaks. It features the *Charcoal Garden* for dining, and *Club Kaphan's* for cocktails, and is

located at the corner of Kirby St.

Closed Wednesday, *Kaphan's* is open 11 to 11 on Sunday, and 11 a.m. to 11:30 p.m. other days, (AAA: "wide variety of very well prepared food... attractive dining area"), 668-0491.

South on Main Street

★ Surrey House Motor Hotel features the *Golden Horseshoe* private club, open from 4 p.m. until "curfew," (AAA: "Good"), 667-9261.

★ *Gaido's Restaurant* features seafood and steak, dress is casual. Open for lunch at 11:30, then again at 5 p.m. Closed Monday, 668-4444.

★ There are perhaps twenty *Dobbs House* snack bars open around the clock, and are spaced over the entire area. One is diagonally across the street from *Gaido's*.

★ Back on the West side of South Main St. is the *White House* Motor Hotel and Restaurant which features "good American cooking with Italian specialties on request." Hours: 6 a.m. to midnight, except until 10 p.m. Sundays, 666-2261.

★ The *Twenty-Nine Palms* Coffee Shop is in the motel of the same name, and is open for breakfast only, plus sandwiches and hamburgers until 2:30 p.m. Closed Sundays, 668-0691.

★ Las Vegas Motor Hotel features the *Feed Lot Restaurant* serving U.S. Choice Steak and fresh seafood, hot lunches daily. Open 6:30 a.m. to 10:30 p.m. seven days. The "private club" closes at 2 a.m., opening at 10 a.m. every day but Sunday, when it opens at noon.

★ *Ramada-Domed Stadium* — "Breakfast, luncheon and gourmet dinner" served in an Early American dining room. The private *Locker Room* has occasional entertainment. Hours: 6:30 a.m. to 9 p.m., (AAA: "Very good"), 666-4951.

★ In the "magic circle" at Route 610 is *Look's Sir-Loin House* which boasts of being "home of the 'Knight on the White Charger.'" Prime and choice steaks, prime ribs, club facility. Lunch 11:30 a.m. — 2 p.m. Mon.-Fri. Dinner 5-11:30 p.m., (AAA: "Very popular... Old-English style"), 782-1520.

'Out of the Way?'

★ For something a little out of the way, continue south on South Main, turn right on Stella St., then right again on Franklin where, on the corner of Milam Street, is the *Restaurant Bismarck* which includes the *Magnolia Club*. Lunch 11:30-2:30. Dinner 6:30-midnight. Closed Sunday, 227-4168.

Continuing the tour, return to the corner of Kirby and S. Main, go a little North on Main, until S. Braeswood St.

★ To the East (right) is the Marriott, which has the *Fairfield Inn*, a family restaurant in warm Spanish and Western decor, moderate prices, open around the clock, seven days, and *Club Sirloin and Saddle*, gourmet dining, dancing, live entertainment, 11 a.m. to 2 a.m., Mon.-Fri. 5 p.m.-2 a.m. Sat., and 5 p.m.-midnight Sunday. (AAA: "Excellent"), 747-6200.

★ To the left (West) on S. Braeswood is the Shamrock Hilton. Relaxed dining in the *Pavilion Room* and *Charcoal Terrace*, overlooking the pool. Texas-size steaks and diversified menu of delicious entrees. *Trader Vic's Restaurant & Private Club* features exotic Polynesian foods. *Pavilion Room* and *Charcoal Terrace* open for all three meals, *Trader Vic's* for lunch and dinner (AAA: "Very Good") 668-9211.

★ Going East (right) on S. Braeswood, turn left on Fannin to find *Pier 21*, boasting the "world's finest seafood," including Maine lobster (home away from home for New Englanders), plus fine steaks and chicken. The Pier also "specializes" in gulf seafood, and dress is casual. Open 11:30 a.m. to 11 p.m. except 10 p.m. Sunday, 747-5211.

Most of the "Western cut" steak houses are located in the downtown area and are not listed here.

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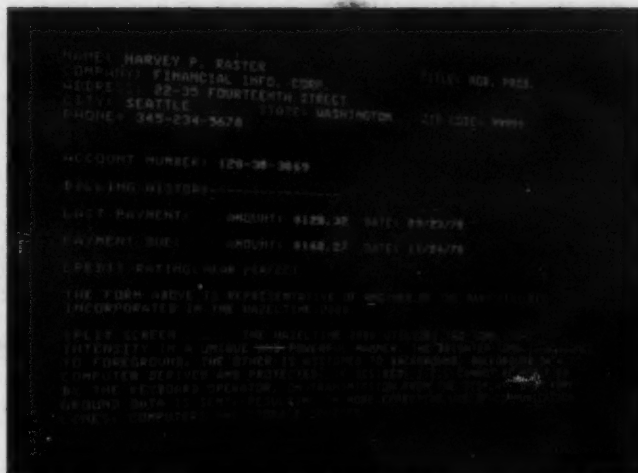
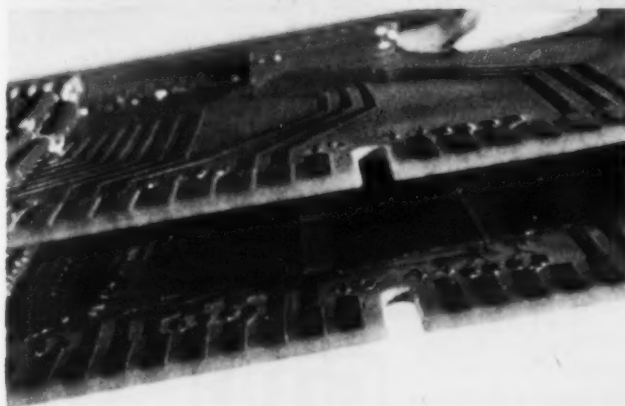
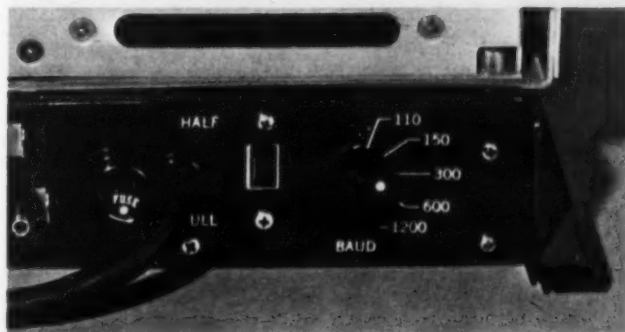
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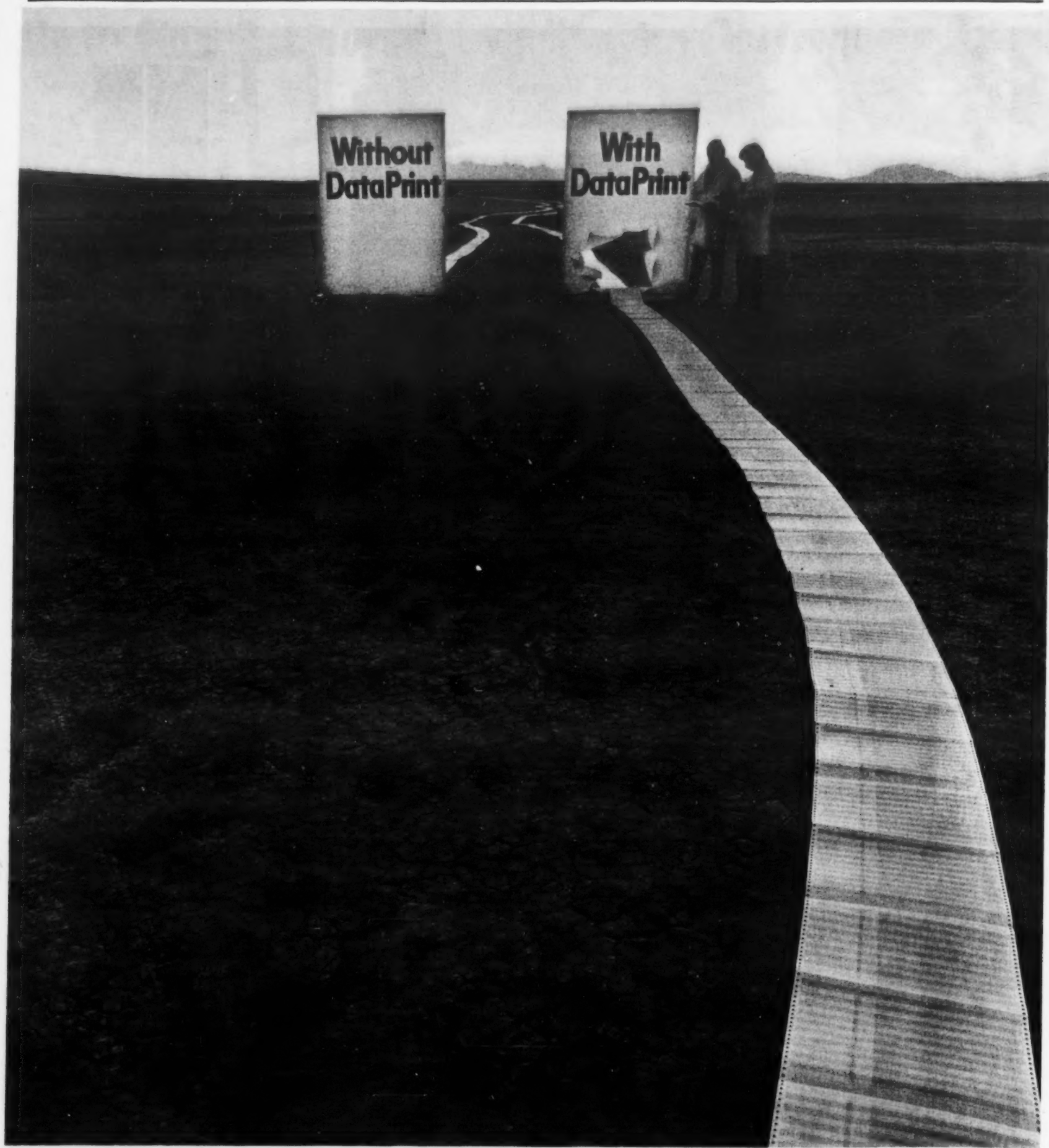
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International Epicurean Delights Houston Highlights

HOUSTON — The host city for the Fall Joint Computer Conference provides scores of interesting eating places, including several specializing in international food.

Following is a list of those members of the Convention and Visitors Council which offer such a bill of fare. The list is compiled alphabetically by country. Most restaurants also serve top quality American cuisine.

★ Argentine: Mama Puchó's, 311 Travis (in Old Market Square), 224-4889.

★ Austrian: Restaurant Bismarck, 719 Franklin, at Milam (in Old Market Square area), 227-4168.

★ Chinese: Timmy Chan Restaurant, 2606 Fannin, 225-0679.

★ Creole: Chez Orleans, 4088 Westheimer, 622-6747; Ravin Cajun, 1710 Richmond, 528-9935.

★ East Indian: The Safari Restaurant & Club, 4902 Richmond Ave., 621-4900.

★ English: Cheshire Cheese Room in the Sheraton-Lincoln Hotel, 777 Polk Street, 224-9041; Look's Sir-Loin Restaurants, 6112 Westheimer, 782-1520, and 9810 Main St., 666-4181; White Horse Cellar, 1211 Fannin, 222-2319.

★ French: Brennan's, 3300 Smith & Stuart, 522-9711; Castille Restaurant & Club, 1617

Fannin — 9th floor, 224-1755; Foulards at the River Oaks, 3435 Westheimer (River Oaks apt. bldg.), 622-7891; Maxim's Restaurant Francais, 802 Lamar, 227-9595; Tony's Restaurant & Club, 2617 Sage at Westheimer, 622-6778.

★ German: Restaurant Bismarck, 719 Franklin, at Milam (in Old Market Square area), 227-4168.

★ Greek: Athens Bar & Grill, 8037 Clinton Drive — near Port of Houston, 675-1644; Parthenon Restaurant & Club, 611 Fannin, 227-8828.

★ International (general): Restaurant Cellini, corner of Stuart and Louisiana, 524-8007; Charley's 517, 517 Louisiana, across from Alley Theatre and Jones Hall, 224-4438; El Chico International restaurants, 239 Sharpstown Center, 774-9889, and 7707 South Main St., 666-2288; Los Troncos, 1516 Westheimer, 528-8684; Rib Room at the Hotel Sonesta, corner Smith & Jefferson, Culen Center, 227-6464.

★ Italian: Del Monico Spaghetti House, 3925 Westheimer Road, 622-5553; Joe DiMaggio's, 3795 Richmond Ave., 623-4233; Tony's Restaurant & Club, 2617 Sage at Westheimer, 622-6778.

★ Japanese: Tokyo Gardens Restaurant, 4701 Westheimer, 622-7886.

★ Jewish: Alfred's, 9123 Stella Link, 667-6541; 2408 Rice Blvd., 529-2891; and 520 Town & Country — home of the Alpine Club, 464-5411.

★ Mexican: El Chico Restaurants, 239 Sharpstown Center, 774-9889, and 7707 South Main St., 666-2288; Molina's Mexico City Restaurant, 4006 Main,

528-8619; Rancho Alegre Resort Motel, Gulf Freeway at Dickinson-Alvin Exit, 1-534-2571.

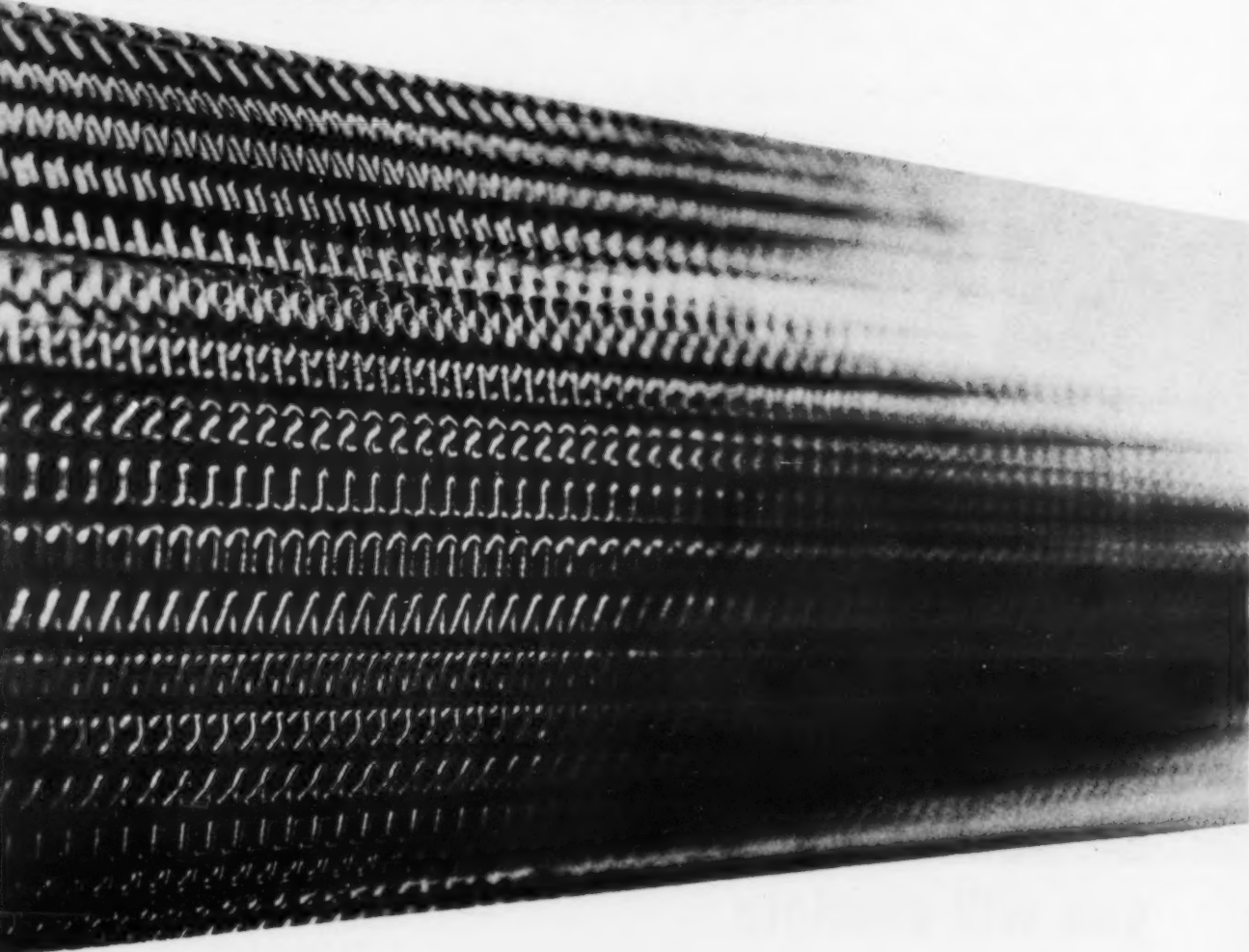
★ Middle Eastern: Phoenicia Restaurant & Club, 4326 Richmond Ave., 622-6780.

★ Polynesian: Trader Vic's Restaurant & Private Club, in the Shamrock Hilton Hotel, Main St. at Holcombe, 668-9211.

★ Spanish: Castille Restaurant & Club, 1617 Fannin — 9th floor, 224-1755.

★ Swiss: Swiss Chalet Restaurant & Club, 511 South Post Oak Lane, 621-3333.

New Drum Printer delivers 1800 lines a minute



You'll get delivery the first of the year.

That's the real news. Quality EDP printing at this speed is certainly important. But actual delivery in just four months gives you the competitive edge now. The new 2470 Line Printer delivers up to 1800 lpm on a standard 132-column format. You'll get crisp straight printout because the 2470 is built around our exclusive one-piece Mark IV hammer. And it's built by the people who've perfected the drum printer. Simple design and conservative packaging mean over 1500 hours MTBF and one hour per month preventive

maintenance. Other features include up to 6 clear copies, and quality OCR printing at reduced speeds. The price is good news also. Less than \$13,000 in OEM quantities. You don't have to wait for the others to catch up. Get delivery on the fastest drum printer on the market by calling our nearest sales office.



DATA PRODUCTS

OEM marketing 18055 Ventura Blvd., Suite 419, Encino, California 91316

Acton, Massachusetts (617) 263-3861; Bethesda, Maryland (301) 653-8120; Cherry Hill, New Jersey (609) 687-7556; Dallas, Texas (214) 231-2940; Detroit, Michigan (313) 354-8828; Los Altos, California (415) 941-5485; Los Angeles, California (213) 961-9800; Melbourne, Florida (305) 723-0720; Minneapolis, Minnesota (612) 927-8747; Amsterdam, The Netherlands 020-156-297; London, England 01-579-2917; Vienna, Austria 34 53 61, 34 44 16

"See us at Booth #1014 FJCC"

Afips Lists Fees And Registration Times for Joint

HOUSTON — Afips has announced the following registration fees and schedules for the Fall Joint Computer Conference.

Fees, for members of ACM, IEEE, SCI, SID and other constituent societies are \$20, including Conference Proceedings.

The charge for non members is \$40, which includes Proceedings. Full-time students pay \$5.

Texas Barbecue/reception costs \$8; luncheon: \$7.50.

Registration Schedule

Conference site (Astrohall) —

Mon., Nov. 16: 6 - 10 p.m.

Tues., Nov. 17: 8 a.m. - 10 p.m.

Wed., Nov. 18: 8 a.m. - 7 p.m.

Thurs., Nov. 19: 8 a.m. - 5 p.m.

Hotel Registration sites (Holiday/Astroworld, Marriott, Rice, Shamrock Hilton) —

Mon., Nov. 16: 5 - 9 p.m.

Tues., Nov. 17: 8 a.m. - noon

Houston Intercontinental Airport —

Mon., Nov. 16: noon to 9 p.m.

Tues., Nov. 17: 8 a.m. - noon

Proceedings Copies Available to Those Not Attending FJCC

MONTVALE, N.J. — Persons unable to attend the Fall Joint Computer conference will be able to procure a copy of the Proceedings, according to the conference sponsors.

The cost to members of Afips' constituent societies is \$13 for the hard-bound printing of the technical papers. Nonmembers pay exactly double.

Digital Scientific



**With our
90-nanosecond ROM
you will emulate
the big ones bit by bit!**

See us in Houston . . .
Booth 1527, FJCC—November 17, 18, 19

Our ROM is so fast that you can emulate *all* operations of a computer, including input/output operations.

If you have IBM 1130 or 1800 computer programs, then the META 4* can be used with microprogrammed emulations in ROM which allow it to **use your existing programs at greater speed and at less expense.**

With inexpensive ROM options, firmware floating-point capabilities perform many tens of times faster than other computers. META 4's capabilities are **not** restricted to IBM 1130/1800 applications. Other computer instruction sets can be emulated.

If your requirement is communications, ROM contents are tailored quickly and easily to allow the META 4 to handle your data communications job more efficiently than any other device.

If you need a special, fast, disc file controller, ROM programs operate the file, do address and data format conversion, and interface to your data processing system—all at low cost and high speed.

The Digital Scientific META 4 saves time while doing all of the things it does best for you . . . solving your problems.

META 4 is a flexible, logical processor controlled by its Read-Only Memory (ROM) so that you can make it into:

- a computer ■ a communications controller
- an FFT processor ■ a COBOL or ALGOL machine
- or a FORTRAN engine.

ROM firmware is custom tailored to turn META 4 into all of the things it does not, at first glance, appear to be. Firmware is the control memory program that executes at **less than 90 nanoseconds per step**. Microprogrammed firmware isn't unique, **but the way it is handled in META 4 is**. META 4 control memory contents can be modified to suit **your** microprogram—modified by **you** at **your** desk if you can't wait for us.

META 4 will process your special instruction sets.
META 4 will process other computers' instruction sets.
META 4 becomes the tool **you** want it to be—
and META 4 is FAST!

*META 4, Trade Mark

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Digital Scientific



**Some
very fast
data about
squares...**

See us in Houston . . . Booth 1527, FJCC - November 17, 18, 19

Digital Scientific

MICROPROGRAMMED FIRMWARE

The above illustration is a pattern board from our high-speed (35-nanosecond access) Read-Only Memory (ROM) that controls the Digital Scientific META 4* Computer System. ■ ROM contains thirty-two 32-bit instructions in a very powerful format. * Trade Mark

NOW AVAILABLE TO THE USER

You microprogram this ROM like software . . . and, with Digital Scientific's assembler and simulator, debug your codes. ■ The final pass of the assembler generates a ROM pattern; then, pattern boards can be prepared by us or by you at your facility. ■ Best of all, you can alter code and make changes, easily and simply, also at your facility.

POWERFUL NEW DATA PROCESSING TOOL

The "big boys" have used "micrologic," but they cannot make this feature available to you . . . depriving you of a valuable new applications tool for your data processing system. ■ This capability, plus a flexible off-the-shelf group of hardware components, makes it possible for Digital Scientific to do a microprogrammed emulation of another computer (such as the IBM 1130/1800 to date). META 4 can be a high-speed peripheral controller or it can do communications (either as a replacement for the IBM 2703 or as a full-scale front-end communications system). ■ META 4 can also be a complete stand-alone data processing system. It will fit the architecture and the specific application.

SPECIFICATIONS

■ Up to 4,096 16-bit words ROM (35-nanosecond access) ■ up to 31 16-bit directly addressable registers ■ up to 256 16-bit words of scratch-pad ■ up to 65,536 18-bit words of 900-nanosecond core memory per memory I/O register ■ up to 8 8,192-word banks per memory I/O register with 4 ports per bank ■ real-time clock ■ storage protect ■ stall alarm ■ firmware floating-point with a 14-microsecond multiply of 32-bit numbers.

Offices Coast to Coast
DIGITAL SCIENTIFIC CORPORATION
11455 Sorrento Valley Road
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A little dropout... is like being a little pregnant.



There's no such thing.

On a read pass, a "little" dropout can cause ten retries. Or abort the job. And on write passes, it may waste up to nine inches of tape.

What's your million-dollar memory doing in the meantime? Waiting . . . expectantly.

In this business, one missing bit can ruin a reputation. That's why there's no such thing as a "little" dropout.

Handling damage causes most dropouts. But now Graham Magnetix has a tape



EPOCH 4
permanent magnetic tape

tough enough to resist this kind of damage. *A tape 80 times tougher than anything the competition has to offer.*

We named our new baby Epoch 4. And started it out in life with a 20-year warranty. Because it's really that good.

Look around. Is one of your transports in a retry cycle right now? Or erasing when it could be writing?

You could be a "little" bit pregnant, and not even know it. Maybe you'd better make an appointment with the man from Graham Magnetix.

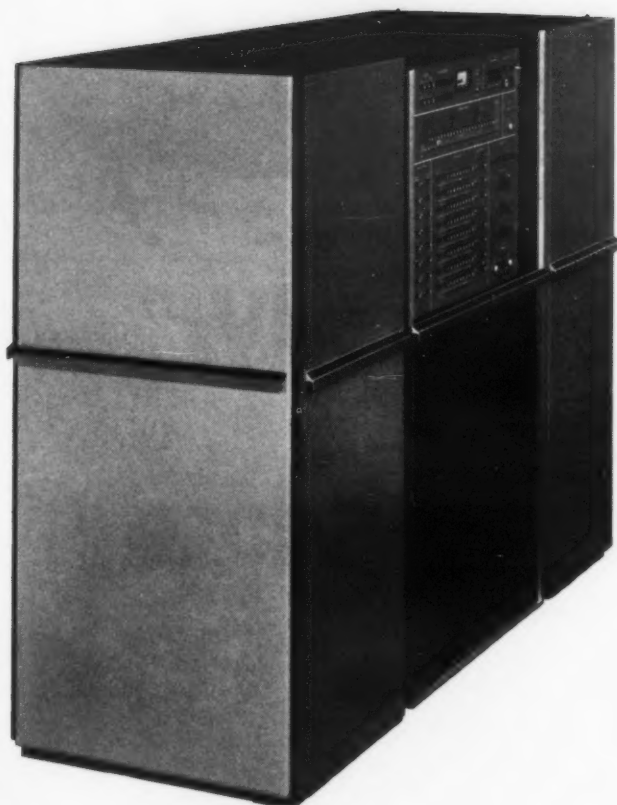
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What others claim, we do.

Ampex Extended Core Memory is busy at more than a dozen operating sites, doubling or tripling IBM 360 throughput. We're the only ones actually doing it on-line.

Our ECM has proved itself at such installations as universities, computer time-share services, a medical service center, governmental agencies and a number of major corporate EDP centers.

Ampex ECM at one university, using 360/65 Computer, has increased its computing speed 3.5 times over operation with the IBM 2361 LCS. Another user confirms that with the 360/50, Ampex ECM runs at 1.8 times the main core, far outstripping the LCS unit.

Our ECM has a cycle time of 4 or 2.8 microseconds, depending on the computer, expandable from 1 to 8 million bytes. It's a direct plug-in system to replace the IBM LCS with no software changes.

You can lease or buy, get direct Ampex installation and service from a worldwide organization of factory-trained personnel.

Call your Ampex representative for a list of operating sites. One call will be the ultimate guide to increasing your computer time efficiency. And you can ask about IBM plug interchangeable tape drives and other computer products from Ampex, the leader in computer peripherals—available individually or on an OEM basis. Call Ampex, (213) 836-5000, or write Computer Products Division, 9937 West Jefferson Boulevard, Culver City, California 90230.

Your computer counts on us.

AMPEX

Visit Ampex at FJCC Booth 3013

JCCFJCCFJCCFJCCFJCCFJCCFJCCFJCCFJCCFJCCFJCCFJ

ICP to Show Tape Drive, Keycette

DALLAS — International Computer Products, Inc. (ICP) is planning to show the Keycette digital recording system and the ICP Incremental tape drive.

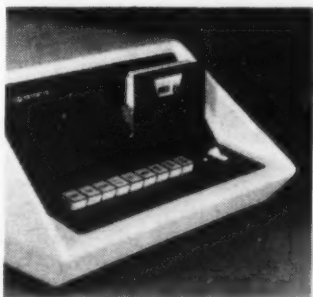
The Keycette uses a parallel buffer memory with incremental characteristics.

Data is stored on magnetic tape contained in standard compact cassettes with up to 700 101-character blocks recorded on a tape cassette.

In the record mode, data from the input device is coupled to the basic Keycette system by interface boards designed specifically for that input device. Two forms of editing have been provided.

The Incremental tape drive is a general purpose character oriented deck that can read and write characters on an incremental basis at rates up to 30 char/sec.

In addition, continuous opera-



ICP Keycette

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ALL WITH IBM M/A
(also 7330, 1311, 729 drives)



DATA AUTOMATION SERVICES, INC.

HP Display Includes 2116C, 2114C Systems

PALO ALTO, Calif. — Hewlett-Packard will be demonstrating computers, and systems peripherals at booth 3002.

Two computer models, the 2116C and 2114C are 16-bit machines which have a new HP-developed folded-planar core memory that takes less space and costs less than previous memories, the company said.

The systems to be featured include a low-cost disk operating system for batch processing and the 32-terminal 2000C time-sharing system. Both systems have expanded data storage capability with moving-head disk memories.

Among the peripherals in the

HP booth will be a graphic plotter, Model 7201A, which operates in conjunction with an IBM communications terminal and develops graphics by drawing vectors or plotting points.

The Model 7970A digital tape drive, a low-cost, IBM-com-

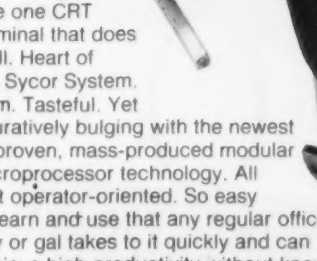
patible unit, for OEM use will also be displayed.

The unit operates at tape speeds up to 45 in./sec, and is available in 7- or 9-track configurations, or with 7 and 9 track in a read/read configuration.



HP 2000C Time-Sharing System

**Sure, the Sycor 340
data communication
system gives you clean source
data
capture.**



Sycor 340.
The one CRT
terminal that does
it all. Heart of
the Sycor System.
Trim. Tasteful. Yet
figuratively bulging with the newest
of proven, mass-produced modular
microprocessor technology. All
of it operator-oriented. So easy
to learn and use that any regular office
guy or gal takes to it quickly and can
achieve high productivity without knowing
a thing about data processing.

Entry by electronic keyboard onto magnetic tape cassettes permits data to be recorded about 30 per cent faster than it would be electromechanically. Scyor 340's unique automatic paging option handles even long or complicated forms by accepting them in small segments, or pages, easily scanned. Then, it automatically displays page after page of labels and field control characters, easy for the operator to follow. And (hallelujah!) no cards, no paper tape to mess with. Just compact cassettes that hold the equivalent of 1400 punch cards. Easy to load and to store. Thriftily re-usable.

You can interface the 340 with the Scyor printer and get all the versatility of high priced line printers. Use multipart, continuous, pre-printed forms for a host of applications.

Like order forms.
Remote invoicing.
Remote payroll checks.
Whatever.

Two 10-digit accumulators—a Sycor first, by the way—generate totals or subtotals detecting keying errors in keying or verifying. Other error detection features include visual proof-programmed entry, format field and character checking, and check digit verification. Add and subtract operations give you automatic total and subtotal field computation and entry without re-keying on an adding machine. Result? Clean tape output—at the data source—that cuts delays and confusion, dramatically lowers mainframe processing costs.

But data capture is only a part of what you really want a terminal system to do for you, isn't it? Sycor's modular system

configured for batch communication, via the voice-grade public telephone network, for attended or lower-cost unattended operation. Sycor's binary synchronous procedures, with automatic retransmission that provides automatic error detection, and speeds of 1200, 2000 and 2400 baud, are compatible with S/360 hardware and software.

You can set up an off-line system that gives you the advantages, but none of the complexities, of teleprocessing, by using the Sycor 610 Communication Converter Station at your central office to record on, or transmit from, computer compatible magnetic tape.

That's another part, right?
Talk to Sycor.

100 Phoenix Drive, Ann Arbor, Michigan
313/971-0900



CTM Unveils UT-1000

MINNEAPOLIS, Minn. — Computer Terminals of Minnesota, Inc. will introduce the UT-1000 series of terminals.

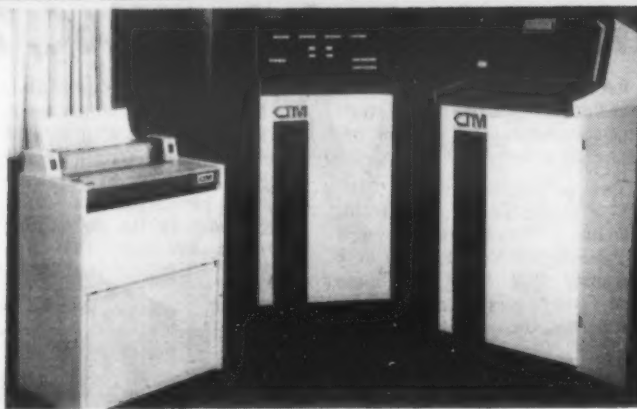
The UT-1000 system hardware consists of a communications processor, card reader, printer, disk, magnetic tape, CRT display, and character printer and can be interfaced with nearly every large computer, according to the firm.

The basic Remote Batch Communications Terminal is capable of providing tabulations and special printouts, along with data communications to and from a large computer.

The Data Entry and Remote Reporting Terminal offers the standard data communications capabilities of the Remote Batch Terminal, plus data capture by means of CRTs and a disk.

CTM's Key-to-Tape Terminal performs batch data communications and provides a semi-permanent record of the message content for storage, the company said.

The fourth member of the UT-



CTM Data Communications Terminal

1000 family is a Message Switching and Concentration Terminal. A multiplexer for multiple low-speed lines and a separate high-speed line permits the system to

store and forward communications, and print incoming messages.

CTM will exhibit at booths 3215 and 3217.

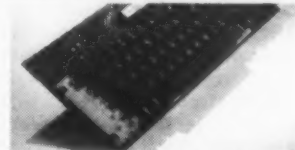
Clare-Pendar Exhibits Keyboard Using LSI/MOS Circuitry Scanning

POST FALLS, Idaho — Clare-Pendar Co. plans to exhibit a keyboard, for the OEM market, that utilizes LSI/MOS technology.

All encoding, up to nine bits and four levels, is accomplished on one LSI/MOS chip. The company said this provides two advantages — single component reliability and plug-in code change capability.

The Clare-Pendar LSI/MOS keyboard uses a scanning technique, searching for a switch closure. Upon detecting a closure, valid encoded data appears at the bit outputs and a strobe appears to signal valid data.

Other features include: up to 88 encoded keys plus any number of direct functions; three modes at no extra cost; 200 mW



LSI/MOS Keyboard

power drain; and two key rollover.

The keyboards also have TTL/DTL/MOS compatibility, and either positive or negative logic, the company said.

Clare-Pendar will be at booth 3712.

Readout Tubes Light Display

LOUISVILLE, Ky. — A family of low-voltage indicator tubes will highlight General Electric's product display.

The three 7-bar segment, vacuum fluorescent tubes are designed to provide alphanumeric readout for commercial and industrial digital display applications.

The alphanumeric tube family consists of the Y-4075 (a 10-pin subminiature base tube in a T-3 envelope), and the Y-1938 and Y-1939 (9-pin miniature base tubes in T-6 1/2 envelopes).

All three tubes can readout 14 different alphabet letters and numbers 0 through 9; in addition, the Y-4075 and the Y-1939 offer decimal points.

GE also will display five special monochrome CRTs; high resolution 4 in. by 5 in.; 7 in., 12 in.; high-resolution 15 in. and 17 in. units. High resolution multicolor CRTs operated in monitors using 4 in. by 5 in. and 14 in. tubes will also be displayed.

The company will be at booth 2808-2810.

**NEED EXTRA
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CAPACITY?**
Especially Burroughs
5500 (Users)

EMR Computer has the following units for sale: Burroughs (B-475) 60 megabit disk file — \$42,000. Requires Burroughs (B-471) electronics unit — \$31,000. Electronics unit can handle up to five storage units providing 300 megabits of storage. Average access time: 20 milliseconds. For further information call or write:

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EMUR COMPUTER

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**FREE
NOW**

The new Datapoint 3360 terminal for IR&D use and its companion 3364 Controller unit represents Freedom Now for companies which utilize 16 or more standard terminals in their IR&D networks—

- ★ *Freedom from excessive costs associated with system operation.*
- ★ *Freedom from inadequate engineering design and low information throughput.*
- ★ *Freedom for your Central Computer System(s) from the nitty gritty of IR&D terminal control and surveillance.*

The Datapoint 3360-3364 combination, developed by Computer Terminal Corporation, provides striking operating and economic advantages for the user. Consider:

1. The 3364 Controller can direct up to 64 3360 terminals *simultaneously*, located either in close physical proximity to the controller or *located remotely*. By contrast, the comparable IBM Controller can handle only eight display units, and they must be situated near the control unit.
2. The Datapoint 3360 has a *standard* CRT screen which displays 80 lines of 20 characters-a-line — 1600 characters in a single display, almost double the capacity of the full screen IBM 2260. This translates directly into speedier data transmission, swifter recall and query resolution. The

The Datapoint 3360 and other outstanding Datapoint terminals will be on exhibit at the FJCC, Astorhall Booth 1001.

Home Office: 9725 Datapoint Drive/San Antonio, Texas 78229/(512) 696-4520

Field Offices: Atlanta, Ga. 30329/1584 Tullie Circle N.E./ (404) 631-0806
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Buffalo, N.Y. 14202/220 Delaware/ (716) 852-5265
Dallas, Texas 75240/4300 Sigma/ (214) 233-1055

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Minneapolis, Minn. 55420/7851 Metro Parkway/(612) 727-1344
New York, N.Y. 10019/1345 Avenue of the Americas/(212) 541-9205

Modem 4500/48 Latest Addition To ICC's Line

MIAMI, Fla. — International Communications Corp., subsidiary of Milgo Electronic Corp., will feature the first of its adaptively equalized 4,800 bit/sec modems.

Modem 4500/48 is the latest addition to the ICC line of data communication products which includes modems operating at speeds from 1,200 bit/sec up to 1 million bit/sec, as well as multiplexers and other related equipment.

Modem 4500/48 was specifically designed for users requiring dedicated full duplex service, and calls for Type 3002, C-2



ICC has 4,800 bit/sec modem.

lines. The data set automatically equalizes, and then adaptively tracks any changes in the amplitude or delay distortion characteristics of the line.

The adaptive equalization feature is self-synchronizing and requires no special programming. The new data set operates at 4,800 bit/sec with low error rate.

The modem will be shown at booth 1003.

Boole and Babbage Featuring Software

PALO ALTO, Calif.—Boole and Babbage will exhibit its computer performance measurement software products for increasing system efficiency and speed.

Problem Program Evaluator (PPE) measures relative program efficiency and provides immediate data needed for improved program speed. **PPE** gives general guidelines to establish proper standards in any language, the company said.

Configuration Utilization Evaluator (CUE) provides information on CPU, channel, and device utilization, on random access device head, and on transit supervisor call usage.

Boole and Babbage said CUE supplies the information needed to continuously balance channels and device utilization to optimize Sysgen parameter specifications. It also helps the user optimize system and application data sets and volumes, and to analyze system requirements, according to Boole and Babbage.

Data Set Optimizer (DSO)

analyzes the system/program wait time associated with data set location on disk volumes. The DSO shows how efficiently present data sets are organized, how to improve that organization, and precisely how much improvement there will be after reorganization.

Boole and Babbage will be at booths 2707-09.

Optical Has ROM Unit

SANTA ANA, Calif. — A read-only memory unit with interchangeable program masks will be shown in booth 2539, according to Optical Memory Systems. The mask is a glass photo-

graphic plate that can be interchanged without altering the electronics of the unit. The masks have transparent and opaque areas that control the pattern of bits to be energized by an infrared light projection system.

Optical said that the ROM has memory capabilities of from 4K to 148K bits, organized into words of from 16 bits to 144 bits each.

The OEM can use the unit to custom-tailor instruction sets for non-standard applications and these can be installed on-site by the user, without help from the OEM manufacturer.

Data Verifier Can Certify Tapes

MOUNTAIN VIEW, Calif. — Recortec, Inc. will introduce a computer tape conditioning device.

The Computer Data Verifier is an off-line desk-top device to check the parity of each individual character recorded on 1/2-in. computer compatible tapes.

A counter will totalize and display the total number of parity errors beginning from the BOT marker, and with a printer option will print out the location of all parity errors.

The unit can also be used to certify blank tapes. It is designed to test all tapes in the user's library, both recorded and unrecorded. Test speed is 120 in./sec; rewind speed is 360 in./sec.

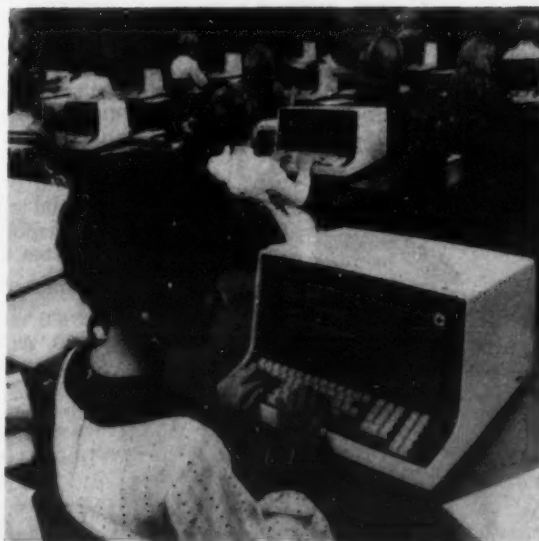
The Computer Data Verifier will be shown at booth 3707.

**for the large scale
Information Retrieval and Display user.**

3360 also has optionally available a buffering capacity of 1920 characters.

3. The Datapoint 3360-3364 combination removes a substantial processing load from your central computer system(s). The 3364, which is actually an 8k digital computer, comes equipped with software which fully automates addressing, buffering and line control for each (up to 64) terminal under its direction. No longer need an expensive computer be tied down with mundane terminal control and editing tasks — the 3364 will do the job at a fraction of the cost. Who knows, you may even discover with the 3364 that there's an extra main frame in your computer room that you don't really need.
4. And it's easy to implement your escape. The 3360-3364 combination is engineered to interface directly with standard IBM 360 configurations and is totally compatible with standard IBM OS and DOS.

Indeed the Datapoint 3360-3364 combination represents Freedom Now of the most substantial kind for organizations which utilize an extensive IR&D network. We'd like to talk to you about it. For further information contact Computer Terminal Corporation, 9725 Datapoint Drive, San Antonio, Texas 78229 (512) 696-4520, or contact the sales office nearest you.

**Computer Terminal Corporation**

A TEXAS CORPORATION

Makers of the Datapoint 3300 for time sharing use.

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Waltham, Mass. 02154/520 Main St./ (617) 237-3720
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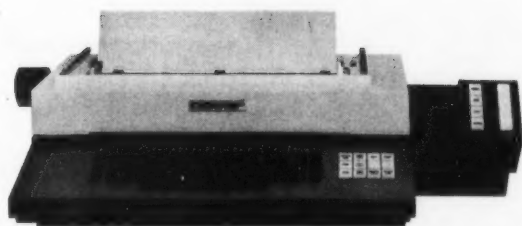
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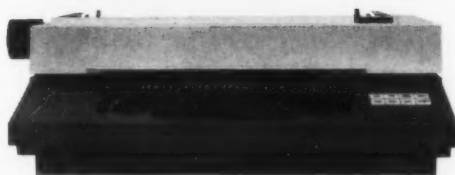
Here are the reasons why over 130 companies have already selected Novar

On every count—human engineering, electro-mechanical engineering, system flexibility, expandability, reliability, styling, field service coverage, and price—Novar stands head and shoulders above all others. And we're sure you'll find an A-B comparison will bear this out.

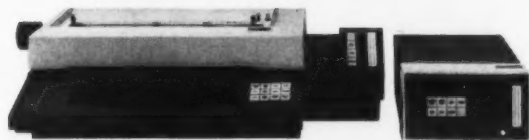
Here then are summary descriptions, and facts, about Novar's terminals and auxiliary devices you may wish to consider when planning or expanding your telecommunication system.



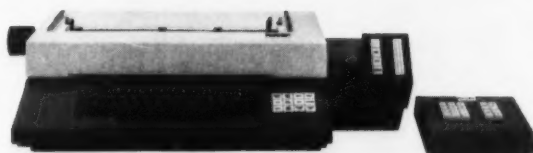
The NOVAR 5-50 Business Data Communication Terminal prepares hard copies of business papers and tape cartridges for computer processing. Data can go on-line, or can be batch entered from tape directly into the computer via telephone lines. Variable transmission rates available up to 2400 bits per second. \$6,715 when purchased, \$195 per month rented, including service.



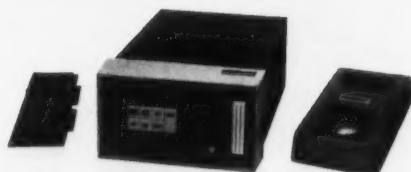
The NOVAR 5-41 Conversational Terminal is portable, weighing less than 50 pounds. Operates on-line with all third generation computers that are compatible with 2741 type devices. Features a unique two-character buffer that prevents the printer from falling behind the computer when receiving data. \$4,500 when purchased, \$115 per month rented, including service. Portable carrying case also available.



The NOVAR 5-51 System, with multiple tape units, performs the functions of computer entry, error-free power typing, automatic typing, teleprocessing, and has the capability for high-speed interoffice terminal-to-terminal communications. When used with Administrative Terminal Systems, the 5-51 provides for editing, insertions, corrections, re-ordering of data and automatic justification. \$8,155 when purchased, \$235 per month rented, including service.



The NOVAR Ten-Key Numeric Input expands the capability of any Novar buffered terminal to include bookkeeping, accounting, engineering, scientific and other numeric functions. Terminals can be ordered equipped with the 5-02, or the unit can be added at any later time by attaching it to the built-in socket that is a standard feature on these terminals. \$490 when purchased, \$15 per month rented, including service.



NOVAR'S Expanding Product Line now includes auxiliary plug-in magnetic tape units, proprietary digital tape cartridge, various built-in modems, an acoustic coupler and terminal desks.

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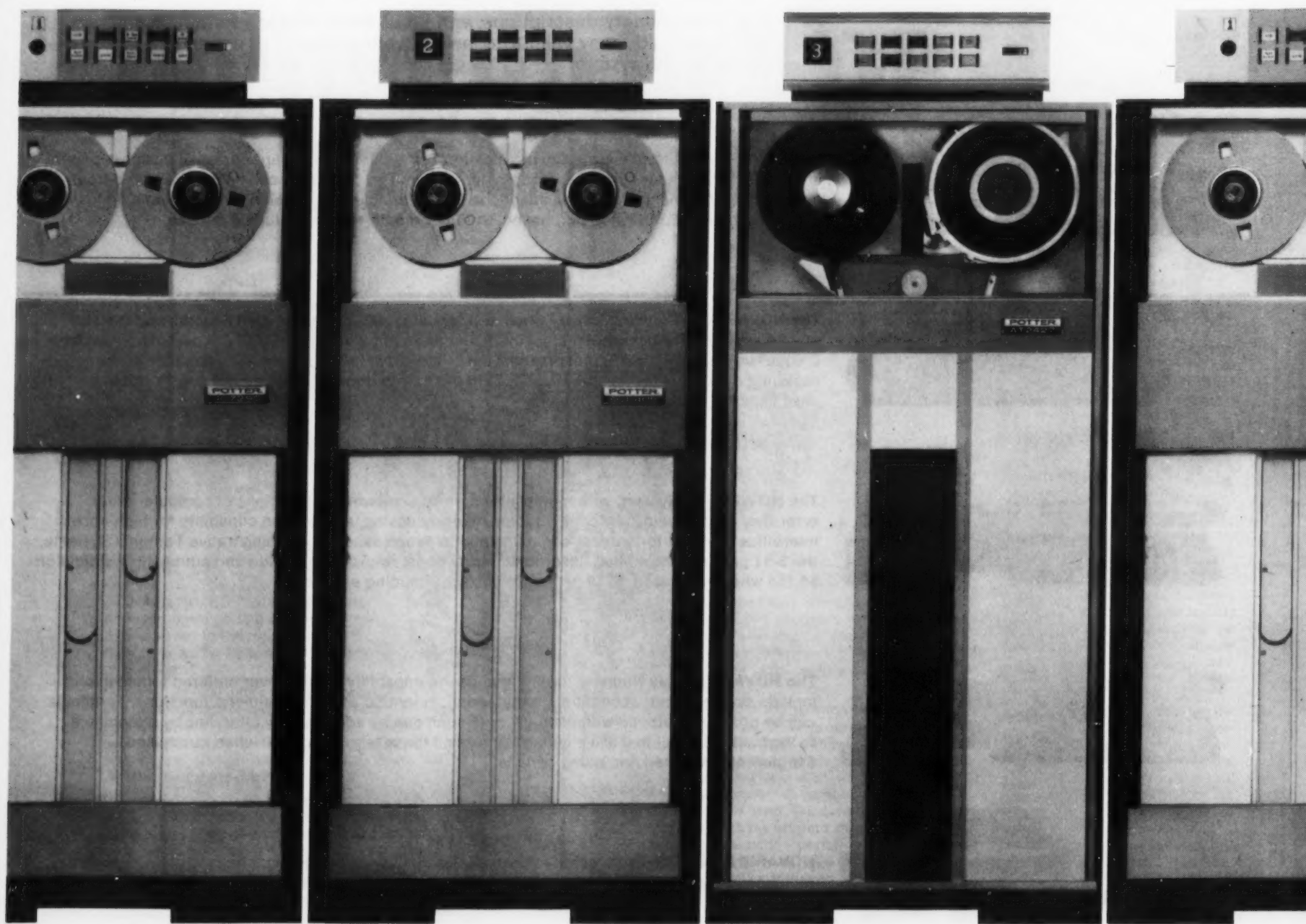
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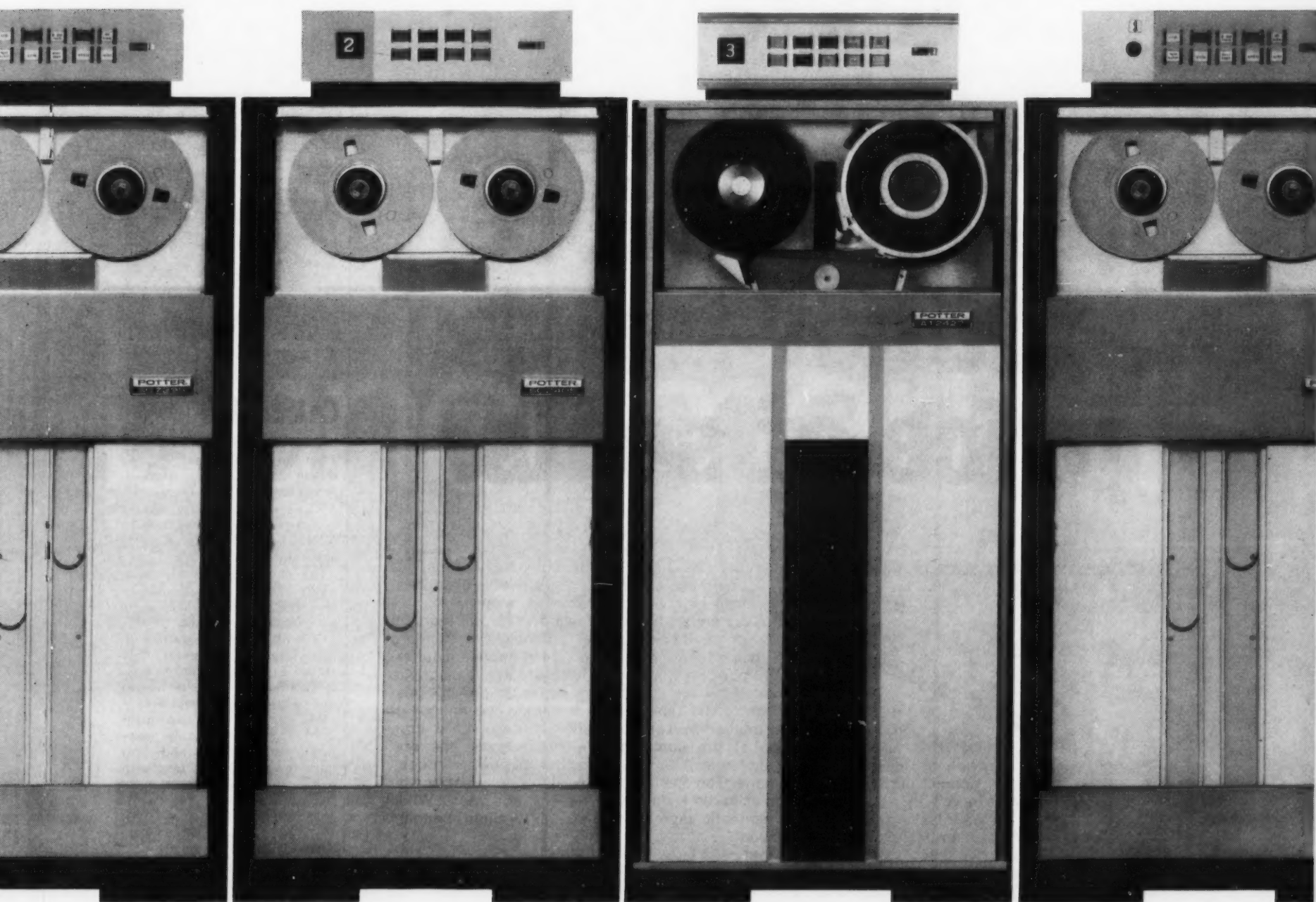


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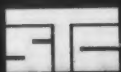
Finally, there's SERVICE RELIABILITY. Potter maintains a nation-wide staff of trained field engineers to give you fast, dependable service... to keep your down-time to an absolute minimum... to keep your jobs on schedule.

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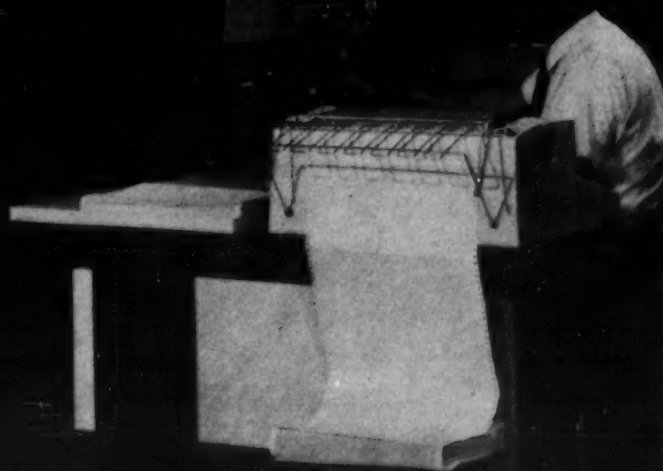
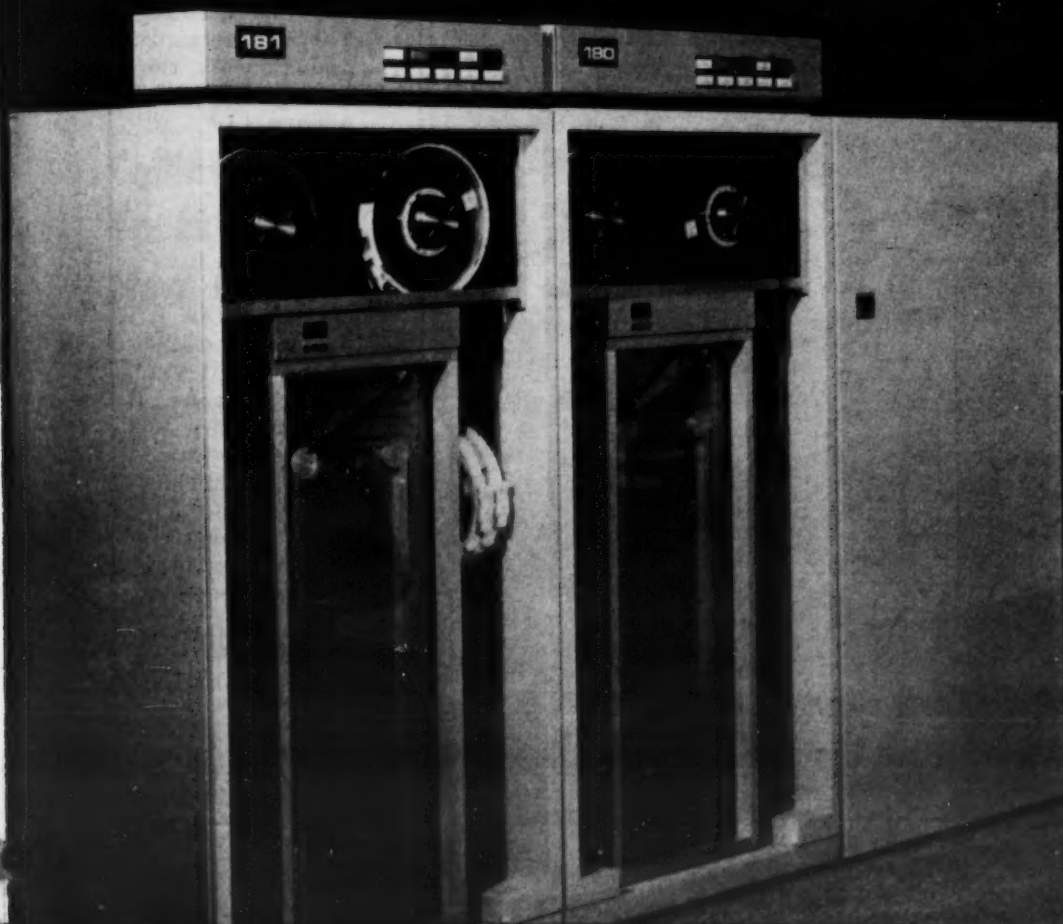
For information on STC tape drives and control units, write or call:

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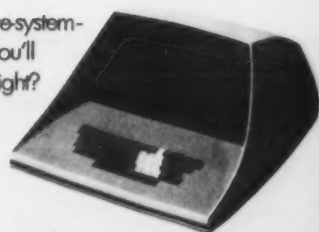


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edited and formatted. No re-systematization is necessary. But you'll believe it when you see it, right? Then write: ENTREX, INC., 113 Hartwell Avenue, Lexington, Mass. 02173. Or phone (617) 862-7230.





An aquatic biologist takes a scientific sample for performing a water quality study.

Pollution Study Aided by River Recreation

APPLETON, Wis. — Scientists at The Institute of Paper Chemistry here are simulating environmental systems on a computer to better understand pollution problems.

Researchers can mathematically recreate their own river and its ecological loads on an IBM 360/44 to study the effects of pollution.

Dr. Robert Holm, director of the Institute's Division of Industrial and Environmental Systems, said: "The research is providing information and insight into pollution problems so paper manufacturers and others can make proper decisions regarding abatement. The computer simulation helps us separate individual or critical problems in more complicated systems."

The computer is used to simu-

late mathematically a river with varying characteristics of depth, width, currents and even rapids. The 360 can also represent the results of such natural processes as biological activity and re-aeration.

The model is based on a material balance formula that calculates the amount of oxygen in the river. In simplified terms, certain forms of pollution use up oxygen, which is needed to support plant and fish life. If oxygen is not replenished fast enough, the plant and fish life are affected.

"Without the computer, this type of research just wouldn't get done," Holm said. "The models are extremely complicated because we are dealing with complex systems. Detailed calculations by any other method

are impractical.

"Simulation in effect allows us to extend instrumentation — to go into areas where it is not practical to measure things directly," Holm said. "The models are based on fundamental physical laws and describe the real physical system in some detail."

Two common types of water pollution study are biological oxygen demand and suspended solids. The first type of pollution can occur when organic materials (that can normally be assimilated) are added in quantities that overload the stream and use up available oxygen faster than it can be replenished.

Suspended solids can pollute the stream when they are sufficient to form a sludge on the bottom and interfere with plant

and fish life.

Since 1940 the Aquatic Biology Group has surveyed more than 10,000 miles of streams and estuaries used by the paper-making industry in the United States and Canada.

This group has developed a biological method of water quality evaluation that consists of sampling the aquatic population.

Tumor Treatment Kept Current With Computer

TORONTO — Doctors at the Ontario Cancer Institute are using a computer to help them determine more rapidly how to best treat different kinds of cancer tumors.

To assist the doctors in making their decisions the GE 425 computer is programmed with details of 45,000 cancer cases treated at the Princess Margaret Hospital in Toronto over the past 12 years.

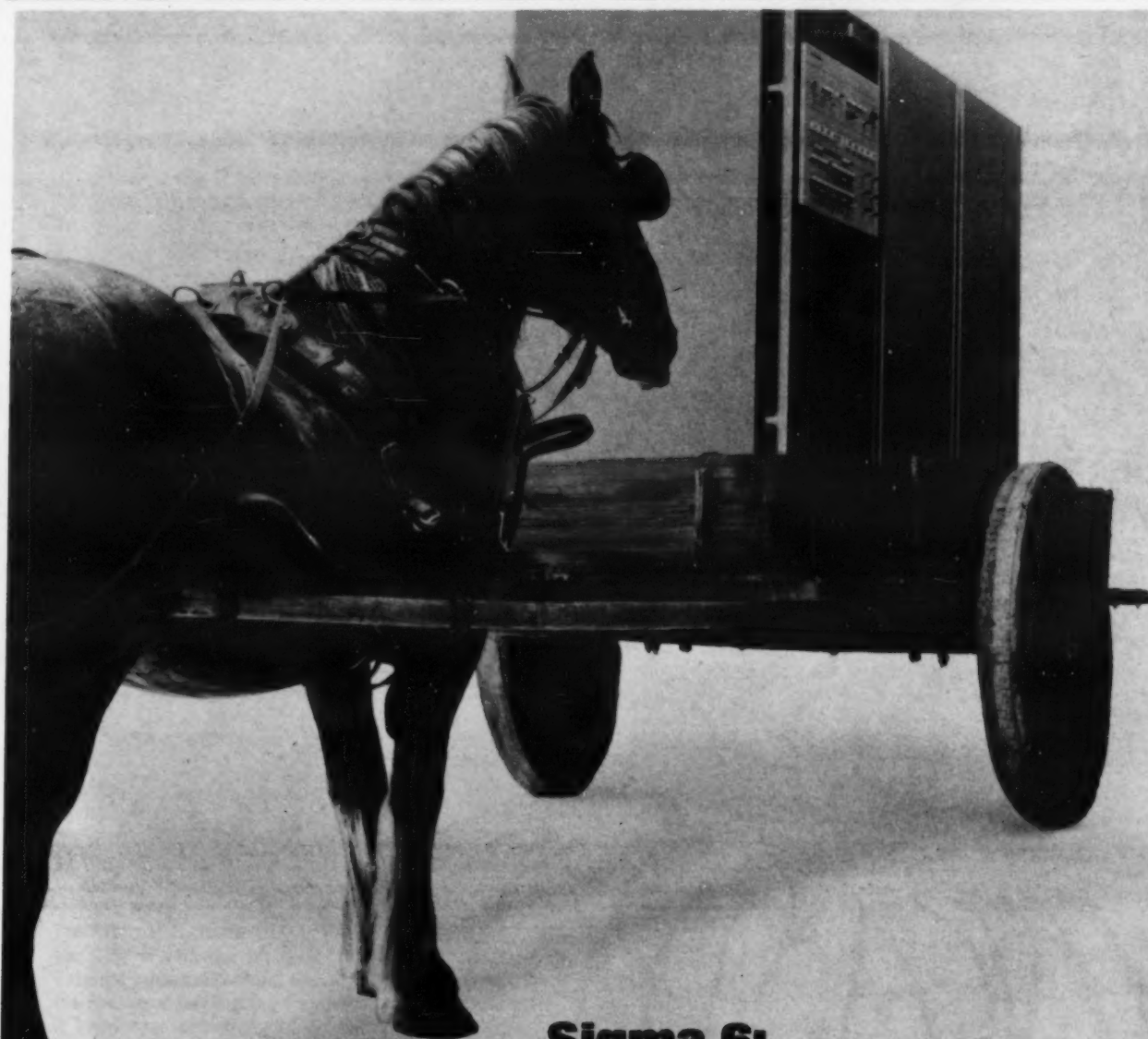
The head of the division of physics at the Institute, Dr. Harold Johns, said that this is the first time that Canadian doctors have had access to such an up-to-date broad comparison method which covered all kinds of tumors.

The computer is used to reveal immediately what kinds of treatment kept alive the most number of patients with certain kinds of tumors, Johns said.

It can also be used to spot trends in cancer that can help identify causes of the disease.

For example, if the incidence of a cancer increases in a certain area of the province, doctors might be able to pick out an environmental factor as the cause.

Johns said that the data bank could be used by doctors at other cancer clinics throughout Ontario by hooking into the computer either through their own terminal, or by contacting the provincial department of health which could then get the answer from the computer.



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Mini Proves Worth in Metal Fatigue Test of Planes

FT. WORTH, Texas — A mini-computer is used by the Ft. Worth division of General Dynamics (GD) to check out important structural components of F-111 supersonic aircraft.

The system, incorporating a Varian 620/i general-purpose digital minicomputer to analyze cyclic metal fatigue tests, has saved the firm more than \$100,000 in the first nine months of operation, according to Alan Arabian, General Dynamics test engineer. The savings is in terms of fewer man-hours required for the tests and less system downtime.

The purpose of the fatigue tests is to enable the builder to determine effects of various loads put upon key parts during actual flight.

GD can then ascertain the life-time expectancy of a part — and the plane.

The procedure for the fatigue test is a vital one in aircraft constructions and attendant safety considerations.

The part to be tested is placed in a test bed, where it is attached to a hydraulic ram.

The ram and the specimen are oriented so that the entire test simulates an actual air load, i.e., a flight condition which actually

would occur during some portion of an F-111 flight.

Cyclic Loading Test

The ram then subjects the specimen to a particular series of loads. The load testing is cyclic; it repeats itself over a given period of time until the total load upon the part is commensurate with a certain number of hours of flight time of the aircraft.

According to the part and where it is situated on the F-111 aircraft, the test is repeated under a new set of flight conditions.

Cycles per condition vary, for most of the aircraft, from one to as many as 1,500.

The hydraulic ram, which is the testing "fist" of the entire procedure, follows the in-

struction of the mini.

This minicomputer, with an 8K memory capacity of 16-bit words generates a sinusoidal signal for the rams to follow, and at the same time counts the number of cycles each ram applies.

When the ram has applied as many cycles as it was supposed to for that condition, the minicomputer automatically changes the condition and redirects the ram into a new series of fatigue tests.

While there is still someone in the test bed keeping his eye on everything, the mini is relieving an engineer from initiating and changing test cycles continuously.

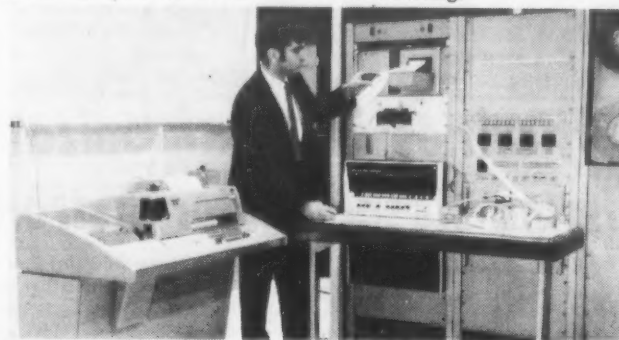
Prior to using the minicomputer, testers at GD used a function generator which put out a sine wave, and a counter to

count the number of cycles, besides a manual potentiometer to vary the amplitudes of the tests.

Arabian estimates that the Varian 620/i cuts down man-

hour requirements by a factor of three.

Aside from the 620/i, a printer, paper tape punch and a teletypewriter also are used to assist in data handling.



General Dynamics test engineer reads stress information from 17 columns of data on a high-speed printout tape during an F-111 metal fatigue test.

Manufacturer Fills Same-Day Parts Shipment

ST. LOUIS — With a constantly changing supply of approximately 4,000 kinds of parts, Carr Lane Manufacturing Co. in St. Louis still manages to fill better than nine out of 10 orders the same day they come in.

"We're using a computer now to process orders as soon as possible," said Earl Walker, company president. "The time we save handling orders means the shipping department has much more time to locate the needed parts, package them and send them on their way that day."

Carr Lane makes and markets through 156 distributors a complete line of components, quick release pins, chuck jaws, gages, bushings, stainless steel components and Carr Lane patented toggle clamps.

As soon as an order arrives, data processing personnel prepare punched cards which are entered into the firm's 360/20.

The cards trigger preparation of an order, packing list, gummed label for the shipment and the necessary records for invoicing which occurs the following day.

As orders are printed, the same data is used to update inventory lists. Analysis of these guides management in reordering stock and scheduling manufacturing operations to insure a better than 90% same-day order filling record.

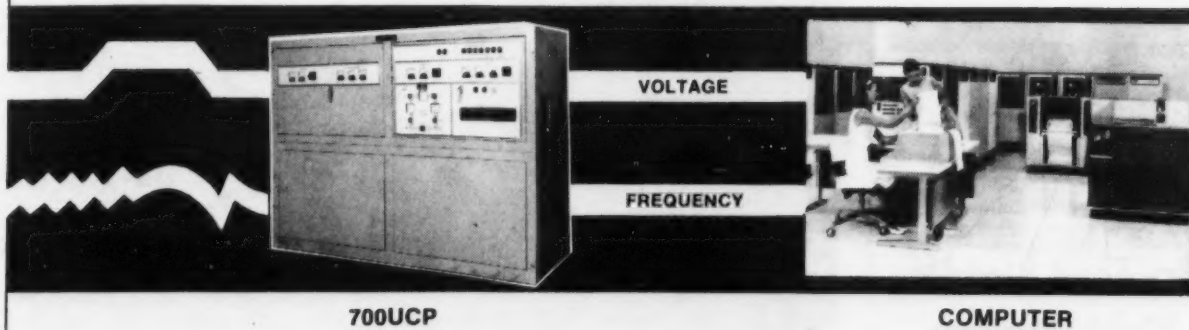
Carr Lane plans to modify its card-oriented 360 to a disk-oriented one. "By storing order and inventory data on magnetic disks," said Dennis Burke, general manager, "we will be able to analyze inventory faster. We now compile inventory reports weekly. By using disk operations, we'll be able to compile exception reports daily."

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Computers to Monitor Prelaunch Trials of Jupiter Craft

REDONDO BEACH, Calif. — Two Pioneer spacecraft, scheduled for flights of 500 million miles to the planet Jupiter early in the 1970s, will be monitored during prelaunch rigors by computers.

TRW, Inc., prime contractor to the National Aeronautics and Space Administration for the Pioneer program, is presently installing two Xerox Data Systems Sigma 5 computers ordered for

checkout and qualifications testing of the spacecraft.

A Sigma 5, as part of a ground-based test station, will be assigned to each of the spacecraft, designated Pioneer F and Pioneer G. Pioneer F is scheduled for launch in February, 1972. Its sister ship is scheduled to follow approximately one year later. Flight time to Jupiter is approximately two years.

Each spacecraft will carry a number of scientific experiment packages, including instruments which will analyze the planet's atmosphere.

Enroute to Jupiter, the spacecrafts' instruments also will measure magnetic fields, solar winds, cosmic radiation, and the nature and intensity of a meteor belt which separates earth from the outer planets.

As these experimental packages are integrated into the spacecraft, they will be thoroughly tested under laboratory-simulated in-flight conditions.

Data from all the instruments will be collected and encoded into a single telemetry signal by on-board communications equipment and then transmitted to a test station in the spacecraft assembly area.

At the test station, the Sigma 5s will process the data and report on the instruments' operations continuously. If a malfunction occurs, the computers will

print a description of the problem for TRW's engineers.

The Sigma 5s also will process data telemetered from such spacecraft operating systems as attitude control devices, power systems and communications systems, as these devices are integrated into the spacecraft.

Shipped With Craft

When the Pioneers are shipped to Cape Kennedy for launch, the computer stations will be shipped with the spacecraft to support all prelaunch test operations, both on the ground and after installation aboard Atlas/Centaur launch vehicles.

At launch, data collection responsibility will be switched to the Deep Space Network, a group of telemetry-receiving stations spaced around the world.

The computers will assist in the analysis of data collected by the spacecraft during their respective two to three year missions.

Difficulties in Synchronization, Timing Resolved for Astronomers

CHARLOTTESVILLE, Va. — Scientists here are resolving compact interstellar radio sources to less than a thousandth of a second of arc with the help of a minicomputer to solve critical timing and signal synchronization difficulties.

At the National Radio Astronomy Observatory (NRAO) near here, scientists are incorporating extremely long — even international — interferometer base lines to achieve resolution as high as one-thousandth of a second of arc in refining man's knowledge of extragalactic radio sources.

The Varian 620/i general-purpose minicomputer being used is adding new mathematical dimension to these astronomical experiments.

Called a "VLB" — for Very Long Baseline — interferometer, the device is achieving at radio wavelengths the same order of magnitude resolution as the highest ever attained with optical instruments, even though wavelengths in the two regions differ by a factor of 10^5 .

The minicomputer is an easily programmable, 4K core memory machine using 16-bit words. The 620/i, performing an enormous amount of calculations and computations, predicts the time delays and phases that should be assigned to the two signals, given the position of the particular radio source being measured.

This forms part of the data processing capabilities of a special-purpose digital device handling the reproduced signals.

This device, specially designed by NRAO scientists, will correlate bit-streams of information coming from two tape recorders. What are known as "fringe frequencies" must be set into this device, and it requires highly accurate information.

Control signals going to the device must be updated at tenth-second intervals to maintain accuracy, a chore which is attended to easily by the mini, which calculates the required information in advance to an accuracy of a part in 10 billion and then gives the device 35 bits of information at the beginning of each tenth-second cycle.

Modern Feed Blending Gets Right Mixture

LINCOLN, Neb. — A Midwestern feed mill uses a small computer to help blend more than 100 different feeds at the lowest cost, and still maintain complete nutritional value.

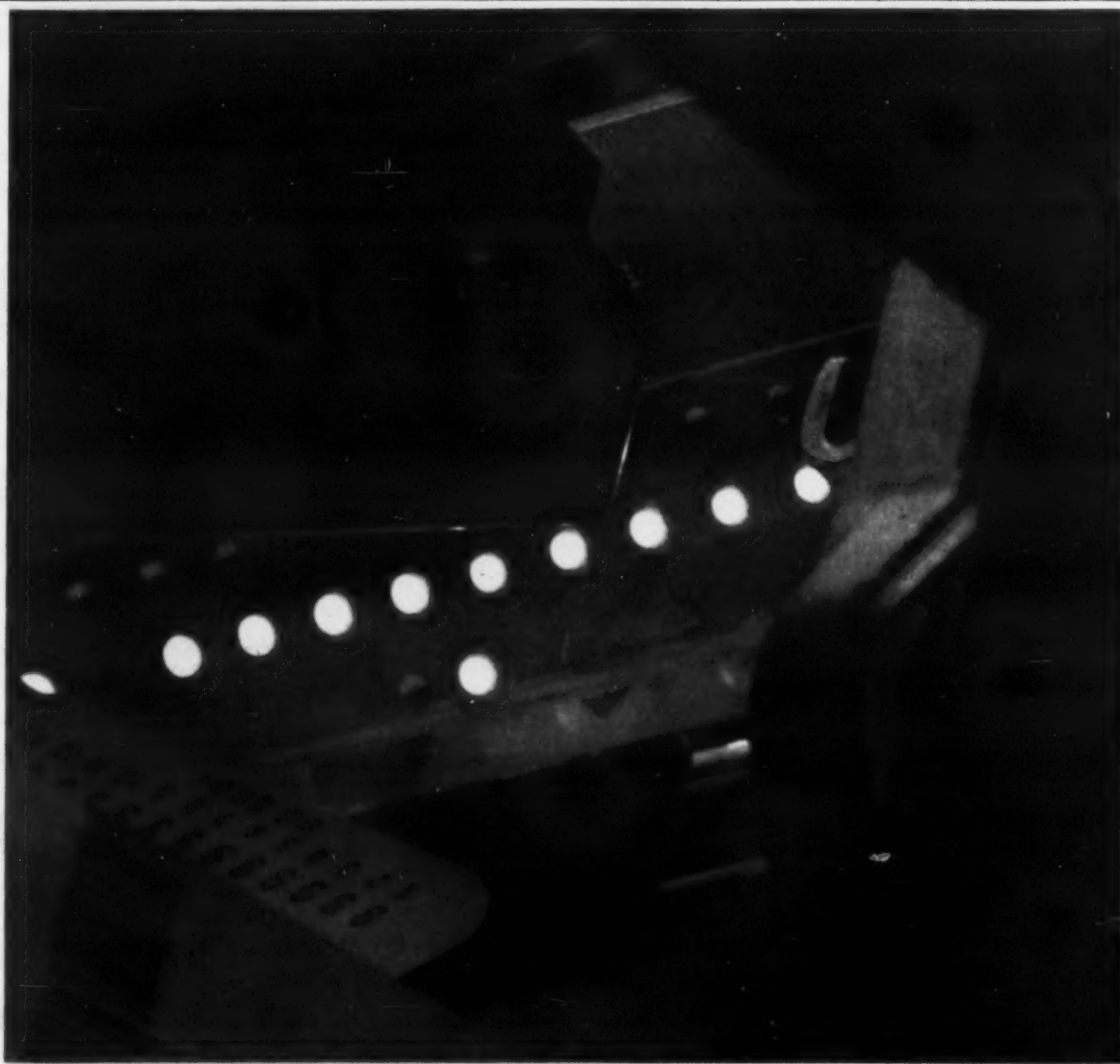
Gooch Milling & Elevator Co. has 800 dealers in 11 states, and is one of the largest regional producers of animal feeds.

A typical animal feed can contain between 15 and 20 ingredients. Depending on the purpose of the feed, it must meet up to 30 nutrient specifications. The computer compares these requirements to ingredients available in Gooch's Mills, and determines the best blend, based on nutritional content and cost.

Gooch uses Linear Programming System, an IBM program product, in figuring its feed blends.

The computer makes a nutrient analysis of each feed, making certain it has the precise amount of such elements as phosphorous or Vitamin A.

In turn, the mini then acts as a middle processor at the other ends of the experimental calculation by accepting data from the receiver device and formatting it onto magnetic tape for a larger central machine which further analyzes and reduces data for the scientists to examine.



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ensure reliability we've developed a network of field service engineers and spare parts depots in the USA, Europe, Asia and Australia. Continuous improvements to include state-of-the-art technology such as fiber optics, IC-control and read electronics is another way we make sure your message gets through. For the product to fill your special need, just give our nearest office a call.



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Mini Plays Three Roles in I/O Processing Of Apollo Telemetry Data at Ground Site

PARAMOUNT, Calif. — A major designer and manufacturer of telemetry ground station equipment being used around the globe to support Apollo missions is relying on a minicomputer for an integral input/output processing and formatting subsystem.

In the Stellarmetrics, Inc. Computer Controlled Telemetry Ground Station, a Varian 620/i is used in threefold role to achieve automatic processing of data at up to 100 kHz response rates.

The computer, according to Stellarmetrics, enables the telemetry station to accept data from a rocket, satellite or airplane, for example, and process

it under computer control and in real time. The system also can take data which was previously gathered and put it on analog tapes, and run that data from the tape through the ground station equipment and analyze it in stored time.

The threefold function of the computer is to set up, via its stored program, various input reception, signal conditioning and preprocessing subsystems, act as an I/O processing and formatting subsystem, and also to perform computational "number crunching" from data stored on digital tape decks.

This means that before a ground station can accept inputs and start a data run, the computer must execute a program already fed to it which activates each and every component of the entire telemetry ground station.

The computer, in effect, makes a check of each component, setting up all operating parameters in each box that has to touch or manipulate data in any way.

After that, the computer changes hats and acts as a large buffer, accepting data from sev-

eral sources such as a data compressor or format synchronizer.

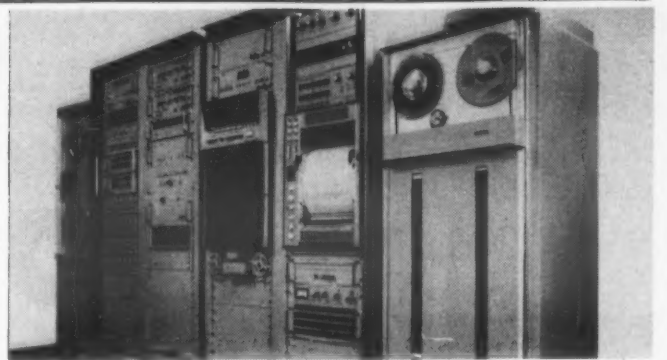
The minicomputer buffers this data to its full capacity so that it can subsequently be output to digital tape or peripheral display devices.

Then, after the data run is completed and the data has been desynchronized, compressed and entered onto a digital tape deck in a format that is compatible with an IBM machine or other central processor, the 620/i performs its third assignment by permitting an operator to go back and replay the tape.

He can enter a new program into the computer and at an after-the-fact slower speed, do a limited amount of computational work in the minicomputer itself.

In this manner he can get engineering answers to various questions and technicians can look at the data and solve problems at their leisure.

Stellarmetrics telemetry processing ground station systems are now in operation at various global locations in support of Apollo missions, and at missile and satellite test ranges and data reduction centers.

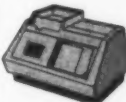


The Stellarmetrics Series 4024 100 kHz Automatic Telemetry Processing Station uses a Varian 620/i mini in three-fold rule.

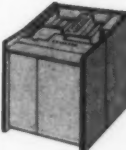
Our complete line of readers. One for every system. All with a quick, sure grasp of the cards...



SR 300 Card Reader—A low cost table-top reader for mini-computers and data terminals. Processes 80-column and 51-column cards at a demand rate of up to 300 cards per minute. 75 cards per minute versions also available.



SR 600 Card Reader—An economical table-top reader for intermediate data processing and data transmission. Equipped with fiber optics and a single light source for increased reliability. Maintains a demand rate of 600 standard and 750 51-column cards per minute.

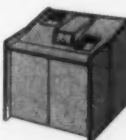


SR 800 Card Reader—A reader for medium-to-high speed card processing, capable of maintaining a reading speed of up to 800 cards per minute. Free standing, with a hopper capacity of 2500 cards. Reject stacker optionally available.



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SP 120 Card Punch—The most economical card punch on the market! Exclusive serial processing mode enables it to punch data direct from the computer without code conversion. Punches up to 275 cards per minute asynchronously.



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Stockholm Inaugurates Reservation System for Real-Time Rail Service

STOCKHOLM — A seat reservation system jointly developed by the Swedish State Railways and IBM has been inaugurated at Tomtebodan, Stockholm.

The system uses an IBM 360/40 and an IBM 3968 communications device to give real-time access from terminals operated by counter clerks.

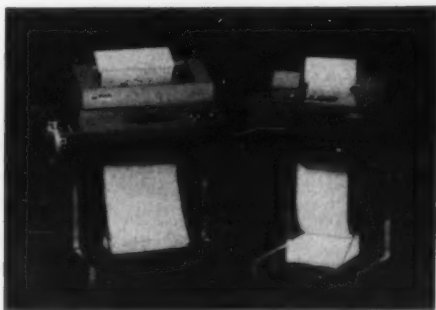
Initially, terminals are being installed in 20 major towns, but the system will support up to 200 terminals. The IBM 3970 data receiver is being used as a terminal.

A real-time service is provided from 4:15 a.m. to 10:00 p.m. The remainder of the time is used in preparation work on train schedules. A back-up service is provided by a 360/50 and a further communications controller normally used for administrative work.

The operational cycle is about 20 seconds. The computer uses OS MFT II, and processes simultaneously the reservation program, list editing and printing programs, and the checking programs for terminals and transactions.

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Adapso Names Goldstein President for 1970-71

NEW YORK — The Association of Data Processing Service Organizations (Adapso) has named Bernard Goldstein president of the 260-member company trade association for 1970-71 at its ninth annual meeting in the Bahamas.

Societies

Goldstein, president of the United Data Centers Inc. in Greenwich, Conn., said in his acceptance speech:

"The important thing is that we must, of necessity, operate our businesses as a business, so that we will be able, in the near future, to obtain new capital and stimulate investor confidence.

"A growth industry, such as ours, must have these two things in order to fulfill its manifest destiny. We must recognize that

we must grow, that we must evolve, in order to serve a truly useful purpose in the economy of tomorrow."

T.J. O'Rourke, president of Tymshare, Inc., Palo Alto, Calif., was elected vice-president and Eugene Usdin, manager, Southwestern Computing Service, Inc., Tulsa, Okla., was elected treasurer.

The makeup of the new board of directors is:

J.G. Bartlett, executive vice-president, National Data Centre Corp., Ltd., Vancouver, B.C., Canada; R.D. Caldwell, president, Data Systems, Inc., Minneapolis, Minn.; and F.R. Lautenberg, president, Automatic Data Processing, Inc., Clifton, N.J.

Also, R.W. Olsen, president, Computer Services Corp., Southfield, Mich.; L.J. Palmer, president, CompuTerminal Corp., San Francisco, Calif.; and K.



Bernard Goldstein

Robinson II, president, Computer Servicers, Inc., Birmingham, Ala.

Also, R. Guise, chairman of the board, Com-Share, Inc., Ann Arbor, Mich.; J.L. Roy, president, Travcom, Inc., Cincinnati, Ohio; A. Steinhart, president, Datalab, Inc., New York, N.Y.; and E.T. Suters, president, Management Services, Inc., Atlanta, Ga.

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Bema Appoints Herzog, Gabetti to Board

WASHINGTON, D.C. — The Business Equipment Manufacturers Association (Bema) has named R.H. Herzog of 3M Co. chairman of the board and G.L. Gabetti of Olivetti Corp. of America will serve as vice-chairman of the board.

Herzog and Gabetti will also be chairmen of the planning committee and finance committee, respectively. D.W. Barr, of Moore Business Forms, Inc., will be chairman of the membership committee, and C.W. Spangle, of Honeywell, Inc., chairman of the nominating committee.

Serving on the executive committee for the year ending October 1971 are Herzog, chairman;

Barr, J.W. Birkenstock, IBM; Gabetti; C.S. Margach of Addressograph-Multigraph Corp.; R.E. McDonald, Univac Division; J.A. Saunders, The General Fire-

proofing Co.; and C.W. Spangle. The Bema Board of Directors for the 1970-71 year will be led by Herzog, chairman, and Gabetti, vice-chairman.

Calendar

Nov. 19-20, New York — Conference '70: 1970 Data Processing Conference sponsored by the DPMA. Contact: Conference Registrar, Conference '70, P.O. Box 1926, Grand Central Station, New York, N.Y. 10017.

Nov. 19-21, Houston — Fall meeting of the Digital Equipment Users Society (Decus). Contact: Angela Cossette, Digital Equipment Corp., Maynard, Mass. 01754.

Nov. 30-Dec. 2, Hollywood Beach, Fla. — 3d International Forum of the International Business Forms Industries. Contact:

IBFI/PA, Graphic Communications Center, 1730 North Lynn St., Arlington, Va. 22209.

Dec. 3-4, Oakland, Calif. — 10th Annual Conference of the California Educational Data Processing Assoc. (Cedpa). Contact: Bradford Burris, National Computer Systems, 991 Commercial St., Palo Alto, Calif. 94303.

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Numerical mathematics, mathematical foundations of information processing, computer software, computer hardware and systems, systems hardware and systems, systems for management and administration, technological applications, and sciences and humanities are the list of categories for classification of papers.

Authors should forward seven copies of a 100-word abstract in English, along with five draft copies of the full text of the paper in English. The text should not exceed 3,000 words, and should be typewritten, double-spaced, on one side of the sheet.

The first page must carry the following information: title of the paper; name, country, affiliation and mailing address of the author, area of the paper according to the above classification of the Ifip Congress topics; language or oral presentation and a statement of originality.

A full set of illustrations, properly keyed to the text, must be included with every copy, but the figures need not be in a finished form, suitable for reproduction.

Submitted papers should be directed not later than Nov. 30, 1970, to Professor C.C. Gotlieb, Vice-Chairman, Ifip Congress 71 Program Committee, Institute of Computer Science, University of Toronto, Canada.

Authors will be notified of acceptance or rejection, and recommended modifications by mid-March 1971. The final copy of accepted papers, ready for publication, will be due by May 1, 1971.

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Educational DP System Gives Hands-on Course to Liberal Arts, Science Students

PALO ALTO, Calif. — Learning how to use a computer is becoming as commonplace for today's young people as learning to drive a car.

At Gavilan College in Gilroy, Calif., nearly every student — whether his major is history, sociology or physics — prepares for a future in a unusual way. One hundred to 150 students a

two years ago with an antiquated vacuum-tube computer.

Herb Peckham, chairman of Gavilan's physical science department, used this computer as the "icebreaker" to prove that a computer could be used advantageously in the school's educational program.

In the fall of 1969, Peckham convinced local school board officials that what the school really needed was a new modern digital computer system that would be totally dedicated to classroom teaching.

That fall, Peckham took delivery of a Hewlett-Packard 2007A Education System.

It was accompanied by several education-oriented peripherals — a device for reading cards marked with an ordinary lead pencil, a teletypewriter for entering and receiving data, and a photoreader which rapidly reads punched paper tape containing computer instructions.

With its Basic Language, the system was valuable to a large number of students in both science and non-science areas.

A particularly important subject for the liberal arts students was statistics, since the subject is a prerequisite to entering many schools or to taking upper level courses.

Peckham initiated computer-aided statistics at Gavilan to offer the liberal arts students an opportunity to use and understand the computer.

Unlike the science students, who quickly learn to solve complex problems by devising relatively sophisticated computer programs, the non-science students learn only enough programming to be able to solve their statistical problems.

For both the science and non-science students, programming is relatively easy to learn.

"By using a computer for much of the calculating necessary to solve their statistics problems, the students are better able to enjoy the subject matter. They avoid the frustration associated with calculating errors," said Peckham.

For educators teaching with a computer, Peckham warned that some students become more proficient at programming than the teachers.

Seventh and eighth graders from Brownell School spend 2-1/2 hours per week at Gavilan running programs they have



Prof. Herbert Peckham explains operation of the Hewlett-Packard Educational Computer System to a student in his statistics class.

written. "Our hopes are to have even greater involvement of the local high schools and junior high schools with the system. With students gaining greater proficiency, using the computer from secondary school through the junior college, we can turn

out very capable students," said Peckham.

"With increasing use of the system, we eventually hope to move up to a time-share system that will enable 16 local schools to use the computer at one time," Peckham said.

Education

day are regularly accommodated.

Almost all of Gavilan's students receive "hands-on" experience with a digital computer before they graduate. Gavilan also brings the students from a nearby junior high school who are proving to be enthusiastic learners.

Gavilan's first venture into computer-aided courses began

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State Gets Inventory Plan

KIRKSVILLE, Mo. — The Northeast Missouri State College data processing center has completed a computerized information system for the Commission on Higher Education of the State of Missouri, according to Dr. Robert Bradley, director of the DP center at the college.

The system is designed to provide an inventory of all facilities in institutions of higher educa-

tion in the state as well as several reports on selected types of facilities. The Facilities Information System consists of a set of 29 programs which handle the input, processing and reporting of functions.

Data is collected from every college in the state on a yearly basis to update the inventory file in terms of additions, changes and deletions to existing facilities.

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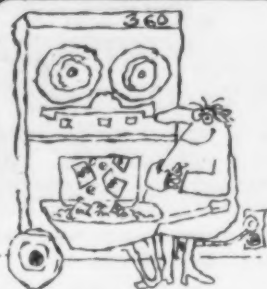
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computer industry

a Computerworld news section about the nation's fastest growing industry

November 11, 1970

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CI Notes

Control Data Seen As Airline Pact Loser

MINNEAPOLIS — Control Data can now be considered among the ranks of "also rans" in the race for the huge computer-based airline ticketing market.

CDC had been a major subcontractor to Burroughs on the recently canceled TWA system [CW, Oct. 28] and had also been a subcontractor to Univac on the United Airlines system, which was canceled last February. CDC lost around \$10 million on the UAL deal and stands to come up \$8 million short on the TWA contract.

Since IBM has apparently grabbed both the UAL and TWA pacts, industry sources consider it unlikely that the CDC machines will be used to supplement the presently planned systems.

ICL-Plessey Sign Plated Wire Memory Agreement

LONDON — A \$2,160,000 order from International Computers Ltd. for plated wire computer memory systems has been announced by The Plessey Company Limited's Components Group. The systems to be supplied by Plessey are its 250 series, a 290 nsec cycle time, self-contained modular unit.

Data Action and Talcott Sign Leasing Agreement

MINNEAPOLIS — Data Action Corp. has announced completion of a leasing agreement with Talcott Computer Leasing, a division of James Talcott, Inc. of New York.

Under terms of the agreement, Talcott will purchase up to \$6 million of Data Action's equipment over a period extending from October 1970 to December 31, 1971.

Present products included in the agreement are the Data Action Magnetic Data Inserter, Tape Pooler and Data Editor.

Ampex Core Memory Deliveries Hit 1,000

CULVER CITY, Calif. — Ampex Corp. has delivered its 1,000th 18-mil core memory stack. The delivery was made to Digital Equipment Corp., Maynard, Mass., as part of a recent contract. The 3-D, 3-wire Ampex stacks are used in mainframe memories of DEC computer products.

Ampex claims it has delivered more memory stacks using 18-mil cores than any other independent supplier. The Amex stacks delivered to DEC accommodate cycle times of 800 nanoseconds.

CW and Computer Exposition Drop Acquisition Discussions

NEWTONVILLE, Mass. — Discussions between Computerworld, Inc. and Computer Exposition Inc. regarding the acquisition of Computer Exposition by CW have been discontinued, CW announced recently.

A CW spokesman said that the discussions were called off when it was clear that agreement on a basis for acquisition was not likely to be reached. Computer Exposition operates the regional Compso trade shows.

Adapso Speaker Sees High Growth in Services Sector in Next 5 Years in Spite of DP Shakeout

NASSAU, The Bahamas — Even though the services sector of the computer industry is apparently undergoing a shakeout, members of the Association of Data Processing Service Organizations (Adapso) were assured of a healthy future at their recent management meeting here.

On the plus side, the keynote speaker, Patrick J. McGovern, president of International Data Corp., while noting that a shakeout was underway, predicted that the services sector will experience the highest growth rate in the industry during the next five years.

On the minus side, Adapso Executive Director Jerry Dreyer noted that out of the 67 members joining the organization in the last year, 54 have had to drop out due to mergers, acquisitions, bankruptcies, etc.

Even with the dropouts, however, Adapso did gain 13 new members and now claims to represent 50% of the sales volume of the service bureau industry.

McGovern said the bulk of service bureau growth will come from the increase in remote access data processing services and from the sale of proprietary software packages.

He observed that while on-site batch service bureau business will grow by 10% during 1970 from \$750 million to \$825 million, remote batch will increase by 50% from \$60 million to \$90 million.

By 1974, McGovern predicted, the on-site batch business will yield about \$1.2 billion in annual revenues, while remote batch will have more than tripled to \$300 million in the same time period.

In contrast, he said, remote access immediate response services (Rair) is enjoying a 40% growth this year, and expected to reach \$165 million by year's end. By 1974 McGovern predicted that annual Rair business will be close to \$600 million.

McGovern estimated the contract and packaged software market at \$560 mil-

lion in 1970, increasing to approximately \$2 billion by 1974.

He indicated that the current shakeout would affect primarily undercapitalized and undermanaged firms. He expected that the number of firms in the service bureau business would decrease by 20% during the 1970-71 period, but the end result would be a much healthier business condition for the surviving firms and for the customers of the industry.

Some concern was expressed at the meeting about competition from the new IBM Basic Systems Centers, which were established to support the application of System/3.

One member said that these centers were offering data processing services to and becoming a growing competitor in the business and he indicated that this might be a violation of IBM's 1956 consent decree.

In relation to time-sharing, the association's Computer Time-Sharing Section will devote most of its energies to fight intrastate tariffs being proposed for lines connected to computers, according to Thomas O'Rourke, president of Tymshare of Palo Alto, Calif.

These so-called Isal tariffs are typically three to five times higher than the regular tariffs, he said, and he noted that the CTSS had helped defeat one proposal in Ohio and was fighting another in Illinois.

Nanomemory 2500 Cycle Time Is 500 nsec, Access Time 300 nsec

HAWTHORNE, Calif. — A core memory system available to the OEM from Electronic Memories has a cycle time of 500 nsec and an access time of 300 nsec.

The Nanomemory 2500 is a development of the company's Nanomemory 2600 that has a cycle time of 600 nsec. The main differences between the two products, the company said, are a change in core size from 22-mil to 18-mil, and timing changes.

The advantage to the customer of this evolutionary development, the company said, is that he is not gambling with a prototype design. He's receiving, the company continued, a standard system with proven performance and reliability.

The 'Nanomemory 2500, a medium capacity 2-1/2D core memory, is capable of storing up to 294,912 bits in a single standard 19 in. rack. Configurations with word lengths of 8, 12, 16, 18, 20, 24, 28, 32, and 36 bits are available. Parity checking by 8-bit byte or word is optional.

All systems electronics and stacks are mounted on plug-in printed circuit boards for easy replacement as well as field expandability.

The price per bit of the Nanomemory 2600 starts at 6 cents. The memories are

currently in production.

Electronic Memories is at 12621 Chadron Ave.

American Airlines Is Still Looking For Better Automated Ticketing

By Michael Merritt

CW Staff Writer

NEWTONVILLE, Mass. — American Airlines has a market and is looking for suppliers.

American's assistant vice-president for ground passenger services, Rodney W. King, said in a recent interview with CW that 35% of the tickets written by his company are amenable to computerization. And while American has been conducting several experiments, it is still looking for the best way to automate.

King estimated that American could use automated ticketing for about 20,000 tickets a day right now, with that figure growing fourfold in the next 10 years. "And American is only one airline," he added.

Describing his firm's efforts to automate ticket printing and vending, King said that American had good results from an experiment conducted at O'Hare Airport in conjunction with IBM and American Express.

At the O'Hare installation standard IATA tickets were printed and magnetically encoded following the passengers' instructions via pushbuttons. The passengers' credit cards, also coded with a mag stripe, were also read automatically. "Our surveys showed that automatic ticket vending (ATV) had 99% acceptance; it was much quicker than hand-prepared tickets," King said. He also noted that American can put the system into operation whenever it feels that the savings in clerk time will equal the cost of the installations.

Credit Card Encoding

But King's main request was for a way of encoding credit cards. For either the ATV system or American's other experi-

ment, the Jets (Jet Express Ticketing Service) system to work, they must be able to read credit cards that can't be easily counterfeited.

The Jets system is less complex than automatic ticket vending. It is designed to sell simple one-way or round-trip tickets by issuing a coupon rather than a standard plane ticket.

King said that 35% of the tickets American sells itself are of the simple A-to-B or A-to-B-to-A type, representing in the neighborhood of 20,000 tickets a day that are now prepared by hand.

"The idea of Jets is so solid, so correct that our desire is to get it progressed rapidly — next month if we could," he stated.

And though most elements of the Jets system are ready to go, American's subcontractor has stumbled on the problem of mass producing the magnetically encoded credit cards that feed the system.

American's reservations system, Sabre, dumps its information concerning a Jets flight into the Jets minicomputer. The mini in turn handles all ticketing from then on — even being able to satisfy seat preference, in an advanced design.

Simple terminals can thus handle the ticketing, rather than the more complex keyboards for the ATV system.

"We've received good support from the computer industry," King noted, "but we are still searching for somebody with an innovation." He added that "there is a large potential market for 'peripherals for ticketing.'"

"We're looking at all the possibilities — mag cards, OCR devices, embossed cards, and we're willing to look at more. Maybe there's somebody out there with an entirely new concept."

McDonnell Douglas Automation Company Names Orthwein Head

ST. LOUIS — James S. McDonnell, chairman of the board of McDonnell Douglas (M-D), announced the expansion of McDonnell Automation Co. to McDonnell Douglas Automation Co. as a computer service business actively pursuing commercial clients coast to coast.

The new company expects to exceed \$100 million in sales in its first full year of business, 1971.

William R. Orthwein was named president and chief executive officer of the new corporation, with A. Joseph Quackenbush as executive vice-president, internal, and Robert L. Harmon as executive vice-president, commercial.



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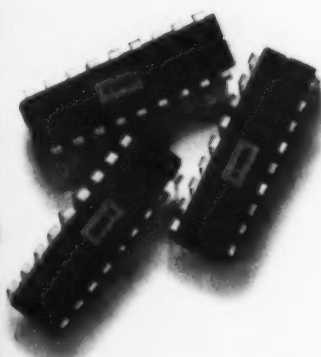
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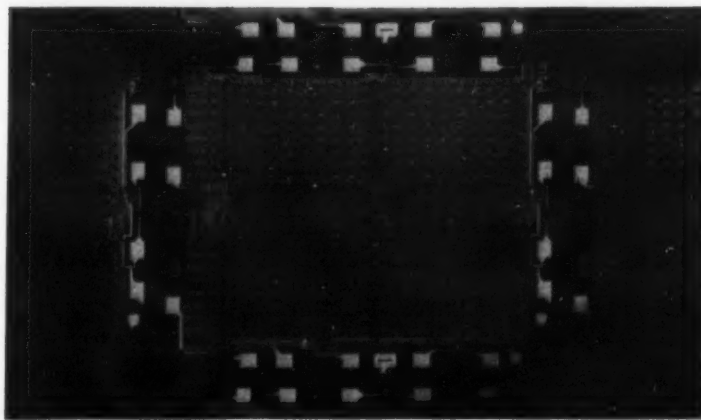
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Contracts

Electronic Memories of Hawthorne, Calif., has received an order in excess of \$1,200,000 from the Department of Defense for delivery of large-scale core memory systems.

Univac has a contract, valued at more than \$1 million, from the Chicago Board of Education that calls for Univac to supply a 418-111 computer, 105 Uniscopes 100 graphic displays and supply operating programs or software, for the implementation of a computer-assisted instruction project.

Burroughs Corp. has received a contract from the U.S. Air Force Logistics Command, valued at more than \$500,000, for the lease of six computer-output-micro-film units.

System Development Corp., Falls Church, Va., has received a \$717,000 labor-hour type contract from the U.S. Navy to develop new computer systems to help monitor submarine and surface ship movements.

Beloit Computer Center, Inc., Beloit, Wis., has announced that the city of Baton Rouge and parish of East Baton Rouge, La., has purchased the rights to use the center's municipal accounting and reporting system, Mars, in its data processing facility.

Computer Audit Corp. of Silver Spring, Md., has been awarded a contract from Dominick & Dominick, Inc., New York, for \$90,000 for development of a turn-key communications system to replace its present IBM CCAP message switching system.

The City of Spokane, Wash., will use census tract and block data gathered and processed by Boeing Computer Services in its urban planning, under a \$33,000, 14-week contract.

Public Safety Systems, Inc., a subsidiary of General Research Corp. of Santa Barbara, Calif., has been awarded a three-year contract by the City of Huntington Beach to develop an integrated command and control system for the city's emergency forces.

Informatics, Inc., Canoga Park, Calif., has been awarded the contract for development of a generalized computer data management system for the State of Hawaii.

Association Processing Corp., a subsidiary of Delta Data Systems of Kensington, Md., has a two-year data processing contract with the Albany Motor Club, Albany, N.Y.

Information and Communication Applications, Inc., Silver Spring, Md., has been awarded a contract by the Post Office Department to provide services in support of a computer-controlled system that uses airline schedules and Zip Codes to route mail pouches and generate airmail dispatch billing data.

Ampex Corp., Culver City, Calif., has received a contract exceeding \$600,000 to supply lithium cores to Plessey Electronics Corp., Hillside, N.J.

General Dynamics Electronics Division, San Diego, Calif., and Kaman Corp., Bloomfield, Conn., have each been awarded a \$300,000 contract by the Air Force Systems Command's Electronic Systems Division for definition studies on the Airborne Weather Reconnaissance System.

RCA has announced an Air Force contract for \$1.9 million to develop a computerized system that will do performance checks on jet engine fuel controls.

The Colorado School of Mines, Golden, Colo., has received a \$117,000 grant from the State Department of Natural Re-

sources to conduct a Colorado lands use and natural resource inventory.

Computer Sciences Corp. of Los Angeles will develop a comprehensive sales training course for the 21 operating companies of the Bell System under a \$155,000 contract from American Telephone & Telegraph Corp.

Cadcom, Inc., Annapolis, Md., has been awarded a contract by the Office of Naval Research to evaluate the applicability of computer-aided design concepts to design of externally mounted electronic systems on advanced submarines.

Management Research International, Inc., (MRI) Austin, Texas, has a joint licensing agreement with Control Data Corp. to provide MRI's Data Management System 2000 through CDC's Data Services Division in the U.S., Mexico, Europe, and Australia.

Edak Operations Analyzer May Eliminate Need for Job Tickets

SANTA MONICA, Calif. — A system for on-line collection and analysis of operating data on continuous process equipment and machinery has been developed by Bissett-Berman Corp., a subsidiary of Plessey Inc.

Known as the Edak Operations Analyzer, the system is designed to monitor as many as 56 (or more) causes of equipment down-time and up to four measurements of productivity.

It is said to eliminate the need for operator crew cards or job tickets, yet is compatible with the customer's computer operation.

The basic Edak system is made up of four units: a selector panel, power supply, data storage module and readout device. Operation is as follows:

The selector panel and power supply are wired into the main control panel and power source, respectively, of the equip-

ment to be monitored. At the beginning of each shift, the equipment operator plugs a data storage module into a receptacle on the selector panel.

When the equipment stops — for any reason — the data module automatically starts accumulating the elapsed time. Then before the equipment can be started up again, the operator must select the appropriate "reason" for the down-time on the selector panel.

This action causes the accumulated time to be assigned to its proper down-time data channel within the module. The equipment is then free to operate as usual.

Costs of the Edak system vary according to the number of functions to be monitored and the type of readout device required.

The Bissett-Berman Corp. is at 2941 Nebraska Ave.

You may be buying semiconductor memories at a distinct disadvantage.

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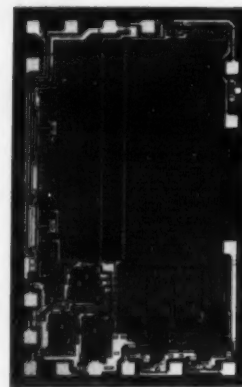
Selection of the type and size of semiconductor memory has been a choice between a "not-always-there-when-you-need-it" component or a card designed for some other computer. When you're trying to build a computer with advanced semiconductor memories while maintaining economical development and engineering costs, any choice became a chance. Until now.

Our business is to provide the computer systems and peripheral equipment manufacturers a flexible, reliable choice of semiconductor memories.

We are building advanced bipolar ROM's and RAM's that are available to you now. But we haven't stopped there. We've put together standard subsystems with up to 9000 bits capacity on a fully tested card. We have the capability to provide a memory component or a complete memory system — you tell us which one you want.

You see, we're not only semiconductor experts, nor are we only computer experts, we are both. Our circuit designers were developing semiconductor memories as long as

five years ago. Our systems people developed memories for the most advanced computers. And we back this all up with manufacturing people who produced TTL products for the largest suppliers in the industry.



By bringing together people from both sides of the fence, we've been able to combine highly reliable semiconductor processes with advanced computer memory organization techniques.

To demonstrate this capability, let's look at some of the products

we are introducing this month. Our first is the fastest 1024 ROM on the market with the lowest power dissipation around. We can program it to your requirements with only a three week turn-around time.

Next is a 256-Bit Read/Write RAM with associated decoder driver. It is loaded with good features — fast cycle time, low

Mini Joint Makes a Splash

PALO ALTO, Calif. — The first and only mini joint computer conference was held here and appeared a smashing success.

Nick Horn of Century Data Corp. and Norm De Nardi of Singer/Librascope were co-chairman.

This initial venture was modestly touted since the originators weren't sure how it would work out. Now there is enthusiastic talk about going on to bigger and better mini joints.

It was put together because of concern for all the people whose travel budgets were being cut and would be unable to be in Houston for the Fall Joint Computer Conference.

The exhibitors were very pleased with the coexhibit and wish to make it a regional show on a quarterly basis.

It is estimated it will cost each participant only \$100 for his participation.

One exhibitor said: "I think maybe we should pull out the of the JCCs and spend money on more regional shows. There is real interest here, not just 'walk throughs' looking at exhibits for the fun of it."

There were 10 exhibitors including two manufacturers' representatives showing more than one product. It was estimated that there were 500 attendees.

Exchange Signals Changes in Real Estate

CW West Coast Bureau

SAN FRANCISCO — Creation of the Pacific Coast Real Estate Exchange portends a new development in the real estate business and another instance of computers improving the business community's practices.

The exchange opened in August and already has \$1.6 billion of properties committed to the file and 85% of the major brokers for the area covered have signed up for the service.

According to Gerald J. Jackson, president of the firm, it would have been impossible to provide his type of service without the speed and economies of super-scale computers.

The firm uses the Control Data Cybernet system, hooked up to the CDC 6600 in Palo Alto with backup at the Los Angeles facility.

A Mark II printer is used as the I/O medium in the exchange's offices.

Purpose of the service is to match up buyer, broker and seller specifications with the best selection of properties available. Cost of use of the 6600 is minimal so that there is just a token fee for the computer service. "Our profit is made

when we find a property match," explained Jackson.

There are 10,000 listings now in the field and each property is described through 200 different items. By the end of 1970 they expect to have the service operating in Los Angeles to serve the southern part of the state, and 18 cities have been selected for the national expansion.

CII Comes up Winner With Loss

BROOMFIELD, Colo. — What happens when a company reports 1969 earnings of \$500,049 and in 1970 turns up a loss of \$305,545 — and the stockholders love it?

Colorado Instruments Inc. (CII) gave this report at its annual meeting this month but stockholders loved the rest of the figures.

In June 1969, fiscal year ending date, CII reported a drop in backlog of orders to \$248,662. This year the backlog is up to \$3,201,569.

The company hired John Zisch as vice-president of marketing and gave him the go-ahead to build up a marketing force which now includes eight major sales offices and five supporting service offices.

Marketing cost was \$400,000 for the year, but it evidently paid off.

In 1969, OEM accounted for \$206,133 of the backlog. CII had signed an OEM agreement with Mohawk Data Sciences but found that it couldn't target the market. In 1970, OEM sales were down.

Contract sales had been \$10,374 and this year they are \$31,694.

Direct sales by its own marketing force accounted for only \$32,155 of the earlier backlog and this year it accounts for \$3,169,066.

Of that \$3,169,066, the bulk is a \$2.4 million sales agreement with Ford Motor Co. for source data collection units to be used throughout its plants.

So far \$150,000 of equipment has been delivered and the order could go much higher than the original agreement if Ford expands use of CII units to all its plants.

Babcock Sees Trend Toward Hybrid Line

CENTURY CITY, Calif. — "Business is too tough to have IBM as the only supplier," said James Babcock, chairman of the board of Allen-Babcock Computing, Inc., as he announced to users of its time-share system recently that they now would be able to realize up to 50% in savings.

"We have returned to IBM about \$500,000 a year in bulk core and now have Ampex core. By this step alone we have been able to pass on sizeable savings to our customers and increase our profits. This is just the beginning. Our next step is replacement of disks, tapes and communications," he said.

Babcock predicted that the trend in the 70s will be toward the hybrid line, and that the day may come when users buy only the CPU from mainframe manufacturers.

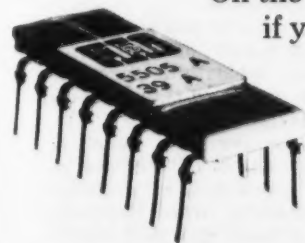
His advice to users considering outside peripherals is to be sure that they are 100% compatible. He also recommended asking for the name of some customers

Industrial Sites Located

MONTGOMERY, Ala. — Development of a computerized system of locating industry in Alabama is scheduled as part of a \$250,000 federal grant.

Boeing Corp., Huntsville, will provide technological aid. Data teams will input information on an area's transportation facilities, labor pool, available utilities and industrial sites. Plant officials seeking new sites can match their needs with individual areas in the state.

power and DTL/TTL compatibility. If you prefer memory subsystems, we have a standard Read/Write 1024 words by 9 bit memory for your buffer or main memory applications. Our memory subsystems are on standard 5 by 7 inch PC cards, organized to the memory size you require. Four different configurations are available now.

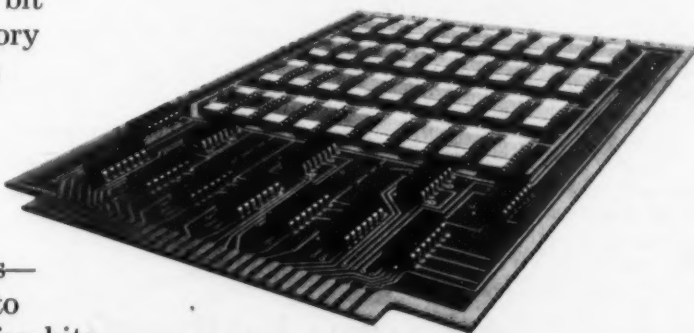


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DP Industry Can Learn From Comparison With Others

By Matthew E. Gilfix

Special to Computerworld

The years 1963 and 1964 for the computer industry might be looked upon as the dawn of a new era. Starting then, the industry has introduced concepts and technologies that are accepted as buzzwords today: operating systems, data communications, time-sharing, whole businesses such as third-party leasing, software houses, facilities management, etc.

As long as this industry and its user-customers were expanding at a rapid rate the excesses and problems building within the industry did not become apparent.

However, 1970 is rapidly becoming the year of atonement for the industry, in which many a management is finding that penitence, prayer and charity alone cannot avert the severe decree.

There seem to be no substitutes for management, marketing and capital.

The murky view is very much like

alphabet soup — ranging from Astrodata through CAI, Data Products and Telex to the fabled Viatron. Among these are some of the names that have appeared in financial trouble in recent days.

Allegory Remote?

Unfortunately, the biblical allegory seems too remote for many people. The computer industry might learn a lot, however, by recognizing that it may not be as unique as most thought during the past decade.

Through being more conversant with the history of other businesses, the EDP industry might better plan and recognize the phases of its own.

In particular, the EDP industry has often been related to the automotive industry, but usually only in the sense that by 1975 outside revenues of \$30 billion will be about the same.

In fact, the comparisons go a lot deeper. They have their Ralph Nader, we have

our Herb Grosch. They have products ranging from a Yamaha bike to a hand-

Viewpoint

tooled Maserati; we have equivalents ranging from Viatron to CDC.

We have five dwarfs now struggling to hold on; they still have American Motors. And in that alphabet soup I mentioned, you can pick any one of them and relate it to a name like Packard, Kaiser, Desoto, Hudson, Studebaker, Corvair, and, of course, Edsel.

Looking back, for their Charles Kettering we certainly had von Neumann. And it is only fair that Tom Watson Sr. be credited with being our answer to Alfred Sloan.

What can we learn then, and perhaps project, from comparison of the two industries? Moving from machine level to assembly level coding was comparable to

the development of the synchro mesh transmission.

The coming of operating systems can be directly equated to the automatic transmission.

The concept of a computer utility, on the other hand, is comparable to the entire public transportation network in that no matter how efficient and cheap it can be shown to be, people would rather ride in their own cars, which creates, of course, machine overcapacity.

AT&T's planning, or lack, for its communications network is not very much different from the highway planning of the 50s. Invariably, their capacity was inadequate by the time they were completed.

I would contend that the system 360s and series 200s of the 1960s were but the horseless carriages of our industry.

The minicomputers of the 70s which will be used as front-ends, terminals, concentrators, peripheral controllers, and uses yet unheard of, are the closest thing to the Model-T of our industry.

The financial turmoil in the industry now is comparable to an era which led to the founding of General Motors and Chrysler, and is bound to leave an indelible mark on the history of our business.

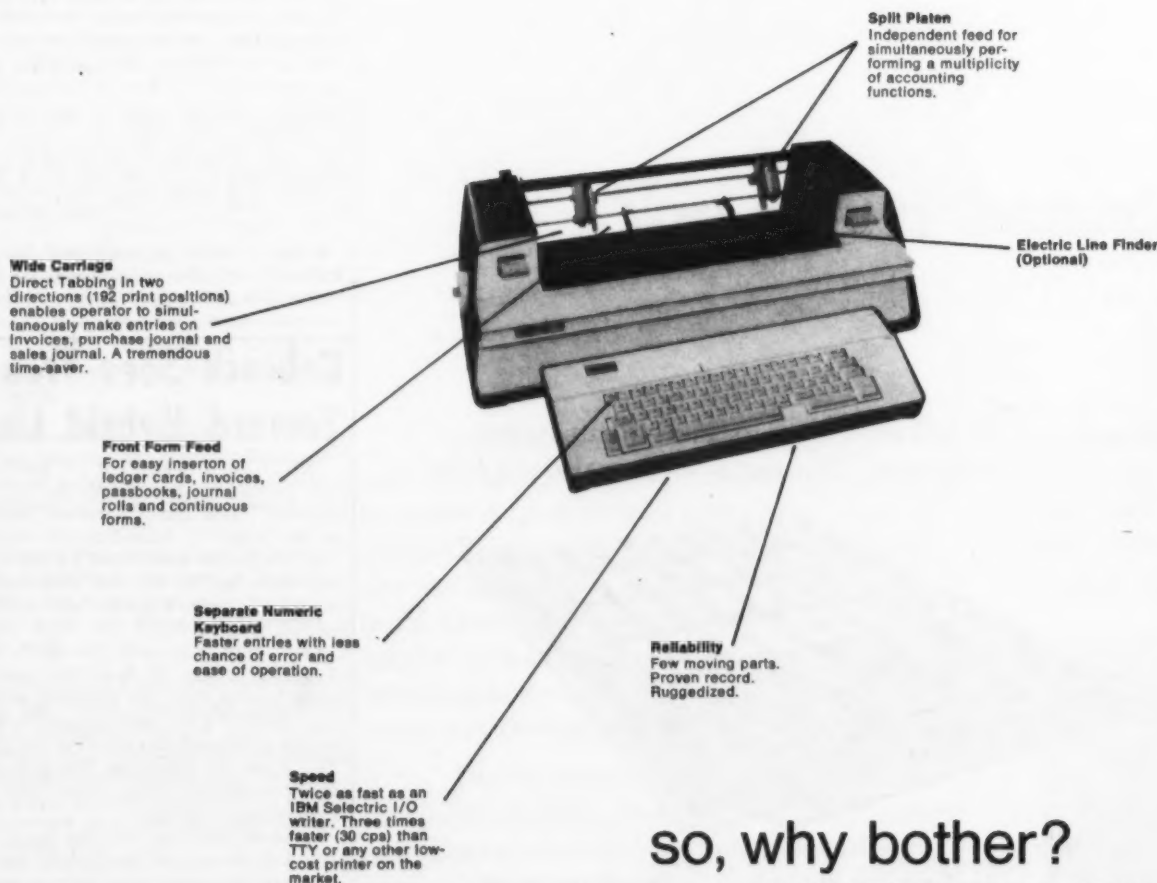
In the absence of expansion personal advancement becomes increasingly difficult. At the other extreme are those who have been or may yet be at least temporarily dislocated.

The smoke will soon clear, however, and the time for redirection is near. Companies and individuals in the DP industry must see to it that what evolves and what is supported is a healthier climate in which true and traditional competition prevails.

In the short run those less fortunate can be assisted in placement. In the long run both the investment decisions and the personal career planning can become strong influences for good on the future of dynamic and exciting industry.

Matthew E. Gilfix is assistant to the vice-president for planning at Honeywell Information Systems Inc.

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Market for Low-Cost Bulk Storage Called Growing Opportunity

COMPTON, Calif. — According to Dr. Donald Gimpel, vice-president of Genesco Technology Corp. here, low-cost bulk storage for computers is a market that cries for the entry of medium to large manufacturers — and that is what his company is doing.

"At present," he noted, "a minicomputer user can pay more for the peripherals than for the computer. If he wants to save money he has to go outside the main manufacturer."

Peripheral manufacturers can produce units for a lower price for two reasons.

First, they are strictly in the electro-mechanical field, which the computer company is not. As Gimpel puts it, "It's a different kind of fish."

Secondly, the computer company doubles price because of the problems of stocking parts, maintaining an inventory and providing service. While Genesco's product is much lower than that offered by the computer companies, "We are not giving away the store," he said.

As far as the health of the industry goes, he said that potential customers now make unexpected plant inspection trips and ask for financial statements.

"This is a situation never before known in the computer industry."

The tape cassette field, he said, is lagging behind Europe, which is well along the way towards standardization.

In August 1970, the standards were drawn up and will be submitted for adoption this December.

Nickels and Dimes

Bit by bit, Levin-Townsend Computer Corp. is extricating itself from Las Vegas. The troubled leasing company had made several real estate acquisitions here during its heyday, only to find that it knew the computer business better than it did real estate. Among the properties bought by its 82%-owned National Equities subsidiary was a country club. National Equities has finally gotten rid of it and several other properties for \$4.25 million and assumption of liabilities totalling about \$7.5 million. National Equities previously charged an extraordinary write-down of \$9.3 million against its Nevada properties in its fiscal year ended March 31... As a result, it said, it won't report any gain or loss on the sale in its current fiscal year. The purchasers were Realty Holdings, Inc., and Country Club of Las Vegas.

\$\$\$

California Computer Products, Inc., reported net income of \$419,788 on revenues of \$8.6 million for the first quarter of fiscal 1971, compared with earnings of \$93,780 on revenues of \$4.6 million for the same period last year. On a share basis, earnings amounted to 18 cents per share on 2,276,671 average shares outstanding, compared with four cents per share on 2,262,047 average shares outstanding a year ago. The 450% increase in per share earnings and nearly 100% increase in revenues for the period represents the largest first quarter in company history.

\$\$\$

Standard Register Co., a major manufacturer of business forms and equipment, has announced that for the third quarter of 1970 ending Oct. 4, net revenues rose to \$25 million, up from \$24.9 million in the same period last year. Nine-month revenue was \$77.3 million up from the same period last year when net revenue was \$75.8 million. Net after-tax income for the nine-month period decreased to \$2.8 million, or \$1.30 per share from \$2.9 million, or \$1.37 per share a year ago. For the quarter, net after-tax income was \$652,128, equal to 30 cents per share. In the same period of 1969, net after-tax income was \$854,773, or 40 cents a share.

\$\$\$

Beckman Instruments, Inc., of Fullerton, Calif. has reported a flat first-quarter. For the three months ended Sept. 30, Beckman earnings totaled \$862,213 on sales of \$31.1 million, compared with earnings and sales of \$875,411 and \$31.6 million in the previous year. Earnings were 25 cents a share for both periods. "Although the domestic economy is softer than a year ago," said Dr. William F. Ballhaus, president, "we have been able to hold sales and earnings at approximately last year's levels."

Unit Bright Spot

CDC's DP Still in Red

MINNEAPOLIS — The computer half of Control Data Corp. is still losing money.

Last of the dwarfs to report for the most recent quarter, CDC revealed that only the operations of its Commercial Credit subsidiary saved it from plunging into the red.

Loss before extraordinary items and Commercial Credit's earnings totalled \$4.4 million for the third quarter and \$16.6 million for the nine months, on total revenues of \$132.4 million and \$401.8 million respectively.

Including Commercial Credit's and extraordinary items, net earnings were \$5.5 million and \$9.9 million or 36 cents and 61 cents a share.

For similar periods in 1969, the overall CDC picture showed net earnings of \$12.2 million and \$42.7 million, or 83 cents and \$2.90 per share. Total revenues in 1969 were \$137.1 million for the quarter and \$410.5 million for the nine months.

Commercial Credit supplied net earnings of \$9.5 million for the quarter and \$26.3 million for the nine months.

R&D Holds Up

Despite the losses, CDC's R&D budget has held up quite well. In the third quarter of 1970 R&D expenses came to \$7.4 million, while in 1969 they were only \$6.8 million. Over the nine months R&D expenses are substantially flat. Since CDC depends on innovation for its competitive edge, maintenance of a strong research program is a long-term bright spot in a gloomy short-term picture.

In the second quarter computer operations had experienced a loss of \$5.6 million.

Early in the fiscal year CDC President William C. Norris had predicted that the computer half of the company would be sad.

"Although we expect that the second half will show some improvement after the first," Norris said when announcing second quarter results, "the year as a whole in the computer portion

of our business won't be profitable."

At that time he went on to say that while CDC had seen some improvement in orders, shipments would not come until 1971.

CDC's situation was also improved by estimated income tax credits of \$2.3 million for the quarter and \$10.1 million for the nine months. Extraordinary items, primarily tax credits on the losses of foreign subsidiaries, were \$322,000 and \$253,000, respectively.

'Lack of Working Capital' Causes Layoffs at SCC

DALLAS — Scientific Control Corp. seems to be knocking at death's door once again.

The terminal maker has announced that it has substantially reduced its working force because of a "lack of working capital."

Earlier this year SCC was taken out of bankruptcy by Great Southwest Corp., part of the ailing Penn-Central group.

While SCC did not reveal the exact number of employees laid off, a company spokesman said that a skeleton crew of 10 to 20 in the engineering, manufacturing, and accounting departments was acting as a "holding force."

Since Great Southwest's purchase of a majority of SCC, an SCC spokesman said, SCC and GSC Computer Investments, Inc., a GSC subsidiary, have been "endeavoring to obtain the additional working capital," but that efforts have been "greatly hampered" by GSC's own liquidity problems.

SCC also revealed that GSC Computer Investments had pledged its shares in SCC to Harris Intertype Corp. to secure payment of a \$100,000 capital loan. The note is now past due, but SCC is "currently negotiating to refinance" the loan.



"What Goes up Must Come Down" ... You've Been Saying That for 5 Years Now."



COMPUTERWORLD

financial

\$4.6 Million Loss Expected By UCC in Third Quarter

DALLAS — University Computing Corp. is predicting a \$4.6 million loss for its third quarter.

According to its preliminary figures, establishment of general reserves of \$7 million, losses on

discontinued operations of just over \$1 million, and operating losses of nearly \$250,000 — a total of approximately \$8.4 million — are responsible for the net loss.

The drop was partially offset by about \$2.4 million in realized gains and investment income from unconsolidated insurance subsidiaries, along with about \$1.4 million of tax loss.

UCC reported a profit of \$3.2 million for the third quarter of 1969.

The company estimated its revenues at about \$29 million for the quarter, well down from \$32 million a year earlier. Nine-month revenue was about \$98 million, up from last year's \$74 million, however.

The \$7 million reserve was set up for contingencies relating to investments, other assets, and the company's divestiture program.

UCC President Charles J. Wyly, Jr. said the determination of the reserves reflects the judgment of the company's management as to possible future losses in those areas.

He emphasized that the reserves were for future contingencies.

Boothe Computer Earnings Increase, Greyhound Computer Net Falls 28%

As for the leasing companies, it's up and down. In San Francisco Booth Computer Corp. announced that its third quarter earnings were up 24%, while in Chicago, Greyhound Computer said that per share earnings for the third quarter were off 28%.

For the quarter, Boothe earned \$785,000 on revenues of \$10.2 million, or 42 cents a share.

This compares with revenues of \$9.8 million for 1969, which brought earnings of \$634,000 or 33 cents a share.

For the nine months Boothe revenues were a record high of \$30.7 million, with earnings of \$2.3 million or \$1.22 a share. This compares with revenues of \$28.4 million and earnings of \$2 million or \$1.10 a share for the nine months ended Sept. 30, 1969.

Fully diluted earnings for the quarter were 39 cents a share in 1970, and 32 cents in 1969. For the nine months ending Sept. 30, 1970, fully diluted earnings were \$1.12 a share compared to \$1 in 1969.

Greyhound Results

Greyhound Computer Corp. had consolidated net income of \$764,000, or 18 cents a share, for the third quarter of 1970, down from net income of \$1 million, or 25 cents a share, in 1969.

For the nine-month period ending Sept. 30, net income

totalled \$2.5 million or 58 cents a share, compared to \$3.7 million, or 85 cents a share, in 1970.

Revenues for the nine months rose slightly to \$37.2 million in 1970 from \$37.1 million in 1969, but third-quarter revenues declined to \$12.4 million from \$12.8 million in 1969.

W. Carroll Bumpers, GCC president and chief executive officer, attributed the decline in earnings primarily to the loss of revenue on U.S. computer rental equipment during the turnaround period between customers and cited a slowdown in the markets for data services as a contributing factor.

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Telex Earnings Rise

TULSA, Okla. — The Telex Corp. has reported that for the fiscal half-year ended Sept. 30, company net income was \$5.2 million compared with \$1.8 million for the corresponding period a year ago. Fully diluted earnings per share increased to 50 cents from the 18 cents per share earnings a year earlier.

Telex sales for the six-month period increased from \$22.6 million to \$40.4 million.

For the quarter sales increased from \$13.1 million to \$23.7 million. Fully diluted earnings per share for the second quarter were 27 cents compared with 10 cents a year earlier.

Telex President S.J. Jatrass attributed improvement in company performance to the progress of the firm's Computer Products Group which sells and leases computer peripheral products.

Backlog improved from \$21.1 million last year to \$28.5 million.

Com-Share Losses, Sales Rise for Year

ANN ARBOR, Mich. — Com-Share, Inc. has reported a net loss of \$3.5 million or \$4.36 per share for the year ended June 30, 1970 compared with a loss of \$2.3 million or \$3.94 per share as restated for the previous year.

New sales were \$4.9 million up from \$3.9 million a year earlier as restated.

For the first quarter ended Sept. 30, 1970, the company reported a loss of \$365,000 or 47 cents per share (unaudited), down sharply from the loss of \$1.1 million or \$1.47 per share (unaudited) for the same period last year.

Quarterly sales increased to \$1.3 million from \$1.2 million. The company attributed the improved quarterly results to reductions in operating expenses as well as increased sales.

Accounting Changes

Com-Share noted its financial statements for 1969 have been restated from amounts previously reported to reflect

reclassifications and certain accounting changes.

The increase in accumulated deficit as a result of these changes was \$802,423 at June 30, 1969, of which \$736,760 is attributable to the year ended June 30, 1969, and the balance to prior years.

Com-Share now reports on a straight-

line basis over the lives of the agreements the revenue received in the form of common stock in other companies, in exchange for providing services.

This change in accounting method resulted in an increase in the loss for the years ended June 30, 1970 and 1969 of \$55,504 and \$723,818 respectively.

Printer Designed to Cut Delays

NEW YORK — A high speed printer, designed specifically to eliminate peak trading order backlogs within the financial community, is being manufactured and marketed by the Shepard Division of Vogue Instrument Corp.

Several Shepard printers are already operating on a test basis within the securities industry.

Capable of receiving and printing 60 trading orders a minute, the printer, Model 828, is said to be the only high-

speed terminal that produces an order ticket in the format accepted and approved by the Floor Committee of both the New York and American Stock Exchanges.

When operating remotely via telephone lines, it has a full-line buffer of 28 characters with an additional 50 character reserve to assure uninterrupted transmission, Shepard said.

The printer, when used on the trading floor of an exchange, can eliminate backlog that often exists during peak trading hours and handles the workload of several teletypewriters now located at each trading post and at many booths maintained by member exchange firms, according to the manufacturer.

The printer is said to furnish instant information capabilities, a safe guarantee in delivering opening price orders, and faster and quieter operations on the exchange floor.

Current communications transmission facilities within the major exchanges are now capable of transmitting 60 buy and sell orders a minute to each terminal, and the Shepard printer can match that capability.

At crucial times during the trading days, such as at the opening, the speed of the printers can guarantee the receipt of opening price orders for timely execution, Shepard said.

ADP Reports Record Earnings, Revenues

CLIFTON, N.J. — Automatic Data Processing, Inc., (ADP) has reported record revenues and earnings for the first quarter ended Sept. 30, 1970.

Net earnings rose 47% to \$878,929 or 16 cents per share from \$598,449 or 12 cents per share a year ago. Gross revenues increased 28% to \$10,312,568 from \$8,071,752.

The company also announced that its common stock, now traded on the Amex, is scheduled to be traded on the New York Stock Exchange effective Nov. 10, 1970.

ADP offers payroll processing and other commercial data processing services from its nationwide network of computer centers.

Optical Scanning Has Red Quarter

NEWTOWN, Pa. — Optical Scanning Corp. disclosed a consolidated loss for the quarter ended Sept. 30, 1970 of \$348,800 or 64 cents per share, compared with consolidated net income of \$146,900 or 27 cents per share (including tax benefits of one cent per share) for the same period a year earlier.

Gross revenues decreased to \$1.4 million from \$2.7 million, down 47% from the previous period.

The anticipated loss for the first quarter of the new fiscal year was due to an overall decline in the computer business that has resulted in order cancellations and stretch-out of existing orders. During this period, operating expenses were reduced, the company said.

Optical Scanning designs and manufactures electro-optical systems which "read" business forms to acquire data for input to computers.

THINK twice

you have a choice
of card punch/readers

But only one of them has all solid-state circuitry, fewer mechanical linkages and parts, better performance and versatility.

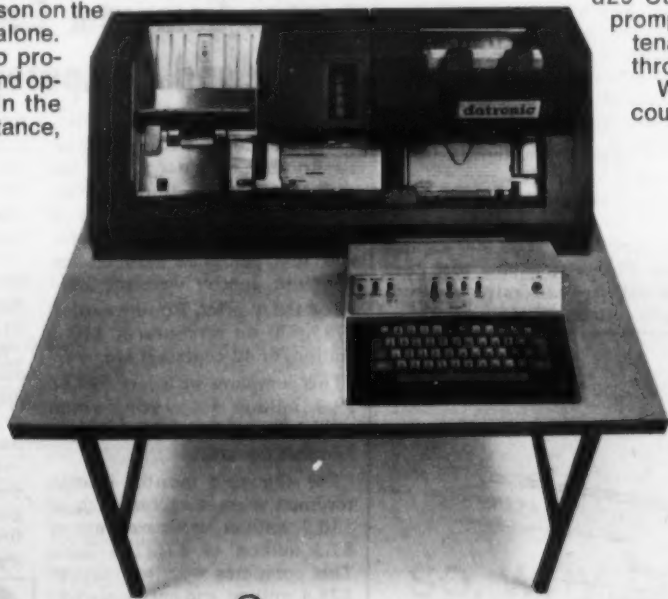
The datronic® Model d29 Card Punch looks and operates like the old familiar unit every keypunch operator has learned to use. The d29 is fully compatible and interchangeable in every application. It merits your comparison on the basis of cost savings alone.

The Model d29 also provides advancements and options you can't get in the 3-letter brand. For instance,

the functions of a verifier can be included. It can be interfaced with a mini-computer. Many other special and custom features are available, such as automatic left zero insertion, high speed skip, interpreting, special character arrangements, etc.

You can rent, lease or buy the datronic® Model d29 Card Punch. Delivery is prompt. Manufacturer's maintenance service is available throughout the U.S.

Write, call, or send the coupon for full information.



datronic® rental corporation

1052 East Meadow Circle / Palo Alto, CA 94303 / (415) 328-8545

Datronic Rental Corporation is completing its first decade of meeting the needs of the data processing industry. It has a demonstrated record of technical competence in supplying systems design, equipment, and software and maintenance services.

I want to know more about the datronic® Model d29 Card Punch.

- ☐ I have an immediate need; please contact me right away.
- ☐ I expect to need card punch/readers soon for my data processing installation.
- ☐ I am planning to install a data processing system.
- ☐ Put me on your mailing list for information about your products and services.

Name

Title

Phone

Organization

Address

Zip Code

Lobbying Would Call Congress Attention to DP Plight

By Phyllis Huggins
CW West Coast Bureau

When the computers slow down, watch out!

And the computers are slowing down. This is an economic indicator of its own, not just for industry and business but for the state of economic health in this country.

Computer sales are off. Forecasts have bit the dust. Orders that were placed for new equipment are being stretched out.

Instead of a serious shortage of programmers, as expected, we have programmers unemployed for the first time.

Many organizations have cut down on the work hours for their installations and have excess machine time for sale.

Why is this a serious economic indicator of its own? Computers are at the pulse of what goes on in this country, in all aspects, and in particular for new activity.

This is one of the few growth

industries. Yet growth is being snuffed out. This affects all the peripheral companies, software firms, every segment of the computer industry. Instead of new improvements being put through the exciting phase of develop-

Huggins' View

ment, we see developments being shelved for lack of capital and user unwillingness to risk new things in this economic climate.

The industry, which was in a marvelous flowering phase of new ideas, new companies and new products, is wilting badly.

Potential customers make unexpected trips to small companies to inspect their factory

and their financial statement, something never before known in this industry.

Research teams are being broken up. Projects are not being renewed. New research money is impossible to find, not just because of aerospace and space cutbacks, but because of anti-intellectualism/anti-research attitudes by both major parties in Congress and lack of spending by Congress.

Robert Finch, in a recent press conference, said it might be two to six years before the country could once again absorb its technical talent. He also said that the Defense Department used to seek out industry, but that government is now a buyers market. In other words, companies have to seek out the government.

But with no guarantees of any

follow-up government spending to write off the research and development costs, return a necessary profit, and make the risk worth the gamble, companies are going to do very little "seeking out."

The American Federation of Information Processing Societies (Afiips) represents not just the technical people in the computer community, but through its exhibits, which are the largest in the industry, it has a responsibility to the total industry.

Lobbying is a dirty word to technical people. However, lobbying is needed to call to the attention of Congress and government officials the plight of this critical industry. It is not just "another" industry. It is crucial to every aspect of our country.

System Development's Earnings Rise, Sales Drop in 1st Quarter

SANTA MONICA, Calif. — System Development Corp. (SDC) has reported earnings of \$428,000 and sales of \$11.6 million for the first quarter of fiscal 1971 which ended Sept. 27, 1970.

This compares to earnings of \$57,000 and sales of \$14 million for the same period last year.

SDC President Wesley S. Melahn said the higher earnings were influenced materially by the tax loss carryforward. This carryforward, he noted, would be used up early in the second quarter. He said other factors which contributed to the first quarter's increased earnings involved reduced administrative, research and development costs.

Even though total sales declined approximately 17%, caused primarily by continued cutbacks in the military market, Melahn pointed out SDC's Public Systems Division followed its upward trend initiated last year.

The division reported first quarter income of \$1.8 million, a 20% increase over last year's record first quarter figure of \$1.5 million.

Major contracts in the Public Systems area which had an impact on increased revenues included the \$2 million award to develop an integrated municipal information system in Charlotte, N.C., and an \$852,000 contract to develop a system for improving freeway diamond interchanges for the U.S. Department of Transportation, Bureau of Public Roads.

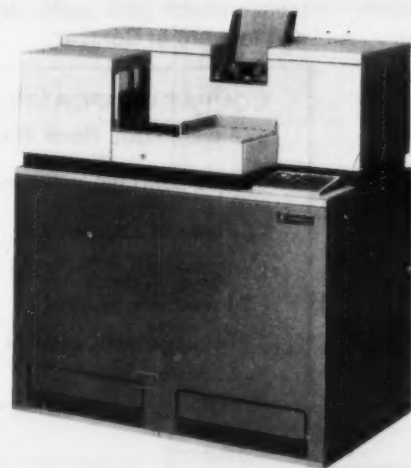
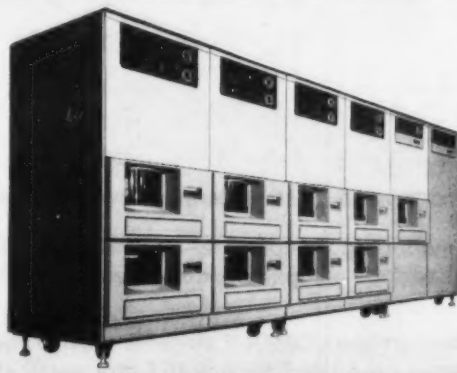
Other important efforts begun during the quarter included Space and Range Division's \$2 million "Pepe" (Parallel Element Processing Ensemble) contract with Bell Labs for the Advanced Ballistic Missile Defense Agency, and Commercial Systems Division's team effort for Insurance Company of North America (INA) in designing a comprehensive computer-assisted operations system.

SDC also has been selected as one of two primary implementation contractors to help develop a master plan for a broad-scale

computer-based information system to serve the U.S. House of Representatives.

COME TO BOOTH NO. 3018

Along the Banks of the Buffalo Bayou (1970 F.J.C.C. in Houston, Texas)



Sam Houston would have loved what we have on display in his beautiful city.

A random-access memory Multi-Pack Drive Unit (model H-8577 I).

You can use it in place of several IBM units. Plus it is plug to plug compatible with the IBM 2314. Its disk pack is interchangeable with the IBM 2316 disk pack, too. Capacity? 233 Mbytes (8 modules).

Our 5 module Multi-Pack Drive is on display, also.

As well as our Disk Pack. Drum Memory Unit. Card Reader Punch. Data Gathering System. Display Tube. Core Memory Module. And mini-computer, HITAC 10.

You can see them all . . . along the banks of the Buffalo Bayou . . . at the 1970 F.J.C.C. in Houston, Texas.

In booth number 3018.

Earnings Reports

BRADFORD COMPUTER & SYS.
Three Months Ended Sept. 30

| | | |
|-----------|-----------|-----------|
| aShr Ernd | \$11 | b\$.05 |
| Revenue | 2,203,814 | 1,326,420 |
| Earnings | 318,925 | 155,405 |
| a9 Mo Shr | .29 | b.13 |
| Revenue | 6,261,942 | 2,947,190 |
| Earnings | 870,306 | 335,844 |

a-Based on average number of shares outstanding before repurchase of warrant. b-Adjusted to reflect a two-for-one stock split effected May 15, 1970.



HITACHI

Telecommunication and Computer Department
International Sales Division

Hitachi, Ltd. Nippon Bldg. No. 6-2, 2-chome, Ohtemachi, Chiyoda-ku,
Tokyo 100, Japan. Tel. Tokyo (03) 270-2111

the outperformers...

smart terminal systems from Compat



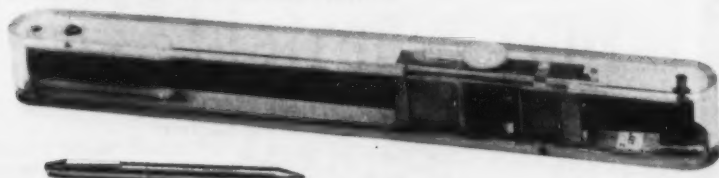
COMFILE™ 88-23 COMPUTER-TERMINAL SYSTEM WITH PERIPHERALS

the outperformers... smart terminal systems from Compat

COMFILE™ 88 multi-purpose computer-terminal systems from Compat Corporation *outperform* comparable computer systems by any standard of measure.

In performance—unique COMFILE systems provide fast, easy input plus simultaneous hard copy for any industry application. Random Access Data storage capacity via high speed error-checked data transmission and reception over telephone lines...simple operation requiring only typists' skills with the use of COMENT™ Software.

In flexibility... versatile COMFILE Systems with Compat's complementary peripherals offer both on-line and off-line applications including satellite data processing...multi-media remote job entry... data transmission...data central batch processing...and perform many other terminal data functions.



The secret of the outperformers:
Compat's unique, 64,000 character random access tape magazine.

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CORPORATION PRODUCTS
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In cost... COMFILE systems' total operating costs are lower on a straight comparison basis; savings become even more significant when cost/performance ratios are considered.

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COMPAT CORPORATION

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Please send me more information on Comfile Systems for:

- | | |
|--|---|
| <input type="checkbox"/> Remote job entry | <input type="checkbox"/> Record maintenance |
| <input type="checkbox"/> Information retrieval | <input type="checkbox"/> Information processing |
| <input type="checkbox"/> Inventory control | <input type="checkbox"/> Other application |
| <input type="checkbox"/> Management control | <input type="checkbox"/> Have representative call |

Name _____

Company _____

Title _____

Address _____

City/State/Zip _____



TRADE QUOTES

Computerworld Stock Trading Summary

All statistics
compiled, computed
and formatted by
TRADE QUOTES, INC.
Cambridge, Mass. 02139

CLOSING PRICES THURSDAY, NOVEMBER 5, 1970

| E X C H | -----PRICE----- | | | | |
|-------------------------|----------------------|------------------------|----------------------|----------------------|-------|
| | 1970 RANGE (1) | CLOSE NOV 5 1970 | WEEK NET CHNGE | WEEK PCT CHNGE | |
| SOFTWARE & EDP SERVICES | | | | | |
| O | ADVANCED COMP TECH | 1- 5 | 1 7/8 | - 1/4 | -11.7 |
| A | APPLIED DATA RES. | 4- 24 | 6 1/4 | - 1/8 | -1.9 |
| O | APPLIED LOGIC | 1- 19 | 1 1/4 | - 1/4 | -16.6 |
| O | ARIES | 1- 8 | 2 1/4 | - 1/4 | -10.0 |
| A | AUTOMATIC DATA PROC | 23- 47 | 42 5/8 | + 3/4 | +1.7 |
| O | AUTO SCIENCES | 3- 14 | 6 3/4 | - 1/4 | -3.5 |
| | | | | | |
| O | BRANDON APPLIED SYS | 1- 9 | 1 1/2 | + 1/4 | +20.0 |
| O | COMPUTER AGE INDUS. | 1- 3 | 1 1/4 | - 1/8 | -9.0 |
| O | COMPUTER ENVIRON | 3- 14 | 2 1/2 | 0 | 0.0 |
| O | COMPUTER INDUS. | 2- 10 | 5 | -1 1/2 | -23.0 |
| O | COMPUTER NETWORK | 3- 14 | 4 | + 1/4 | +6.6 |
| O | COMPUTER PROPERTY | 5- 15 | 6 | - 1/2 | -7.6 |
| | | | | | |
| N | COMPUTER SCIENCES | 6- 34 | 10 7/8 | - 1/8 | -1.1 |
| O | COMPUTER USAGE | 2- 8 | 3 5/8 | - 1/8 | -3.3 |
| A | COMPUTING & SOFTWARE | 16- 75 | 28 7/8 | -2 3/4 | -8.6 |
| O | COMRESS | 2- 10 | 2 1/4 | - 1/4 | -10.0 |
| O | COMSHARE | 3- 15 | 4 1/8 | + 1/8 | +3.1 |
| O | CONSOL. ANAL. CENT. | 1- 3 | 1 1/4 | 0 | 0.0 |

| | | | | | |
|------------------------|--------|--------|--------|-------|--|
| O DATA AUTOMATION | 1- 24 | 1 5/8 | + 1/4 | +18.1 | |
| O DATA PACKAGING | 5- 29 | 6 1/2 | 0 | 0.0 | |
| O DATAMATION SERVICE | 1- 6 | 2 1/4 | + 1/2 | +28.5 | |
| O DATATAB | 4- 9 | 4 1/4 | 0 | 0.0 | |
| O DIGITEK | 1- 5 | 1 1/4 | - 1/4 | -16.6 | |
| O EDP RESOURCES | 5- 13 | 7 | - 1/4 | -3.4 | |
| A ELECT COMP PROG | 3- 11 | 4 5/8 | 0 | 0.0 | |
| O ELECTRONIC DATA SYS. | 31-161 | 65 1/2 | -1 | -1.5 | |
| O INFORMATICS | 4- 21 | 6 1/2 | + 1/2 | +8.3 | |
| A ITEL | 6- 26 | 17 1/2 | +1 1/4 | +7.6 | |
| O LEVIN-TOWNSEND SERV. | 1- 13 | 2 1/4 | 0 | 0.0 | |
| A MANAGEMENT DATA | 8- 25 | 10 | -1 | -9.0 | |

| | | | | | |
|------------------------|--------|--------|--------|-------|--|
| O NAT COMP ANALYSTS | 1- 8 | 2 3/8 | - 5/8 | -20.8 | |
| O NAT. COMP. SERV. | 3- 12 | 3 1/4 | + 1/4 | +8.3 | |
| N PLANNING RESEARCH | 13- 54 | 17 1/2 | -2 1/2 | -12.5 | |
| O PROGRAMMING METHODS | 9- 27 | 15 1/2 | 0 | 0.0 | |
| O PROGRAMMING & SYS | 2- 5 | 2 | 0 | 0.0 | |
| L PROGRAMMING SCIENCES | 1- 33 | 1 1/4 | 0 | 0.0 | |
| N SCIENTIFIC RESOURCES | 2- 22 | 4 1/8 | - 1/8 | -2.9 | |
| O SOFTWARE SYSTEMS | 1- 2 | 1/2 | - 1/8 | -20.0 | |
| O TBS COMPUTER CENTERS | 4- 27 | 4 3/4 | + 1/4 | +5.5 | |
| O UNITED DATA CENTER | 2- 4 | 2 1/4 | - 1/4 | -10.0 | |
| N UNIVERSITY COMPUTING | 14- 99 | 21 3/4 | -1 5/8 | -6.9 | |
| A URS SYSTEMS | 5- 21 | 8 | + 1/2 | +6.6 | |

| | | | | | |
|-------------------------------------|--------|--------|--------|-------|--|
| O U.S. TIME SHARING | 3- 14 | 2 7/8 | + 1/8 | +4.5 | |
| PERIPHERALS & SUBSYSTEMS | | | | | |
| N ADDRESSOGRAPH-MULT | 21- 62 | 23 7/8 | -3 3/8 | -12.3 | |
| O ALPHANUMERIC | 2- 15 | 3 3/4 | + 1/8 | +3.4 | |
| N AMPX CORP | 13- 48 | 16 1/2 | - 7/8 | -5.0 | |
| O ASTRODATA | 3- 34 | 2 1/4 | - 1/4 | -10.0 | |
| O ATLANTIC TECHNOLOGY | 3- 14 | 5 1/4 | + 1/4 | +5.0 | |
| A BOLT, BERANEK & NEW | 3- 11 | 7 | - 3/8 | -5.0 | |
| N BUNKER-RAMO | 6- 14 | 8 5/8 | - 3/8 | -4.1 | |
| A CALCOMP | 11- 34 | 33 5/8 | +1 3/8 | +4.2 | |
| O COGNITRONICS | 3- 13 | 5 7/8 | - 7/8 | -12.9 | |
| O COLORADO INSTRUMENTS | 4- 13 | 6 1/8 | - 1/8 | -2.0 | |
| O COMPUTER COMMUN. | 5- 36 | 6 1/2 | -1 1/4 | -16.1 | |
| A COMPUTER EQUIPMENT | 4- 12 | 4 1/8 | - 1/8 | -2.9 | |

| | | | | | |
|------------------------|--------|--------|--------|-------|--|
| A COMPUTEST | 14- 28 | 15 | 0 | 0.0 | |
| A DATA PRODUCTS CORP | 5- 26 | 7 1/8 | + 3/8 | +5.5 | |
| O DATA TECHNOLOGY | 4- 23 | 3 3/4 | 0 | 0.0 | |
| O DIGITRONICS | 4- 13 | 4 1/4 | - 1/4 | -5.5 | |
| N ELECTRONIC M & M | 7- 40 | 9 1/2 | - 1/4 | -2.5 | |
| O FABRI-TEK | 3- 8 | 2 5/8 | - 3/8 | -12.5 | |
| O FARRINGTON MFG | 2- 17 | 2 3/4 | 0 | 0.0 | |
| O INFORMATION DISPLAYS | 4- 20 | 6 1/2 | -1 1/4 | -16.1 | |
| O MANAGEMENT ASSIST | 1- 4 | 1 1/4 | + 1/8 | +11.1 | |
| A MARSHALL INDUSTRIES | 14- 67 | 25 1/2 | - 1/4 | -0.9 | |
| A MILGO ELECTRONICS | 15- 42 | 33 3/4 | + 7/8 | +2.6 | |
| N MOHAWK DATA SCI | 19- 87 | 25 7/8 | -4 5/8 | -15.1 | |

| | | | | | |
|-----------------------|--------|--------|--------|-------|--|
| O OPTICAL SCANNING | 11- 52 | 16 1/2 | -1 | -5.7 | |
| O PHOTON | 4- 17 | 9 1/8 | + 5/8 | +7.3 | |
| O PHOTO-MAGNETIC SYS. | 1- 9 | 1 3/8 | + 1/8 | +10.0 | |
| A POTTER INSTRUMENT | 15- 42 | 20 1/8 | -1 3/8 | -6.3 | |
| O PRECISION INST. | 6- 25 | 8 3/4 | + 1/4 | +2.9 | |
| O RECOGNITION EQUIP | 13- 83 | 16 5/8 | + 5/8 | +3.9 | |
| O REDCOR CORP. | 4- 34 | 4 3/4 | - 5/8 | -11.6 | |
| N SANDERS ASSOCIATES | 7- 29 | 12 1/4 | - 1/8 | -1.0 | |
| O SCAN DATA | 5- 53 | 5 3/8 | + 1/8 | +2.3 | |
| O TALLY CORP. | 10- 23 | 14 1/2 | -1 | -6.4 | |
| N TELEX | 10- 25 | 21 7/8 | - 5/8 | -2.7 | |
| O VIATRON | 2- 51 | 3 5/8 | 0 | 0.0 | |

| | | | | | |
|-----------------------------------|--------|--------|--------|------|--|
| SUPPLIES & ACCESSORIES | | | | | |
| N ADAMS-MILLIS CORP | 8- 15 | 13 | + 1/4 | +1.9 | |
| O BALTIMORE BUS FORMS | 7- 21 | 7 1/4 | + 1/4 | +3.5 | |
| A BARRY WRIGHT | 6- 25 | 8 1/4 | 0 | 0.0 | |
| A DATA DOCUMENTS | 15- 35 | 17 1/4 | - 1/4 | -1.4 | |
| N ENNIS BUS. FORMS | 10- 19 | 10 3/8 | -1 1/8 | -9.7 | |
| O GRAHAM MAGNETICS | 5- 10 | 9 1/2 | - 1/4 | -2.5 | |
| O GRAPHIC CONTROLS | 7- 17 | 7 5/8 | + 3/8 | +5.1 | |
| N MEMOREX | 46-166 | 82 3/8 | +2 1/4 | +2.8 | |
| N 3M COMPANY | 71-114 | 89 1/4 | +1 1/8 | +1.2 | |
| O MOORE BUS. FORMS | 27- 38 | 32 1/2 | - 1/2 | -1.5 | |
| N NASHUA CORP | 21- 43 | 26 3/4 | - 1/2 | -1.8 | |
| O REYNOLDS & REYNOLD | 25- 48 | 36 1/2 | + 1/2 | +1.3 | |

| E X C H | -----PRICE----- | | | | |
|------------------|----------------------|------------------------|----------------------|----------------------|-------|
| | 1970 RANGE (1) | CLOSE NOV 5 1970 | WEEK NET CHNGE | WEEK PCT CHNGE | |
| O | STANDARD REGISTER | 17- 30 | 17 1/4 | + 1/2 | +2.9 |
| N | UARCO | 22- 39 | 22 1/2 | -2 | -8.1 |
| A | WABASH MAGNETICS | 7- 30 | 8 3/4 | + 3/8 | +4.0 |
| O | WALLACE BUS FORMS | 18- 41 | 17 1/2 | -18 1/4 | -51.0 |

COMPUTER SYSTEMS

| | | | | | |
|------------------------|--------|---------|--------|-------|--|
| N BURROUGHS CORP | 78-173 | 114 1/4 | + 3/4 | +0.6 | |
| N COLLINS RADIO | 9- 37 | 14 3/4 | - 1/4 | -1.6 | |
| N CONTROL DATA CORP | 30-122 | 44 3/4 | -1 1/4 | -2.7 | |
| O DATA GENERAL CORP | 16- 59 | 27 | +2 3/4 | +11.5 | |
| A DIGITAL EQUIPMENT | 50-124 | 60 | + 1/2 | +0.8 | |
| N ELECTRONIC ASSOC. | 3- 11 | 4 3/4 | + 1/8 | +2.7 | |
| A ELECTRONIC ENGINEER. | 3- 14 | 4 1/2 | - 3/8 | -7.6 | |
| N FOXBORO | 18- 39 | 21 7/8 | + 3/8 | +1.7 | |
| O GENERAL AUTOMATION | 9- 42 | 11 1/4 | -1 1/2 | -11.7 | |
| N GENERAL ELECTRIC | 60- 88 | 86 7/8 | +1 | +1.1 | |
| N HEWLETT-PACKARD CO | 19- 45 | 27 | + 3/8 | +1.4 | |
| N HONEYWELL INC | 65-152 | 77 | + 3/8 | +0.4 | |

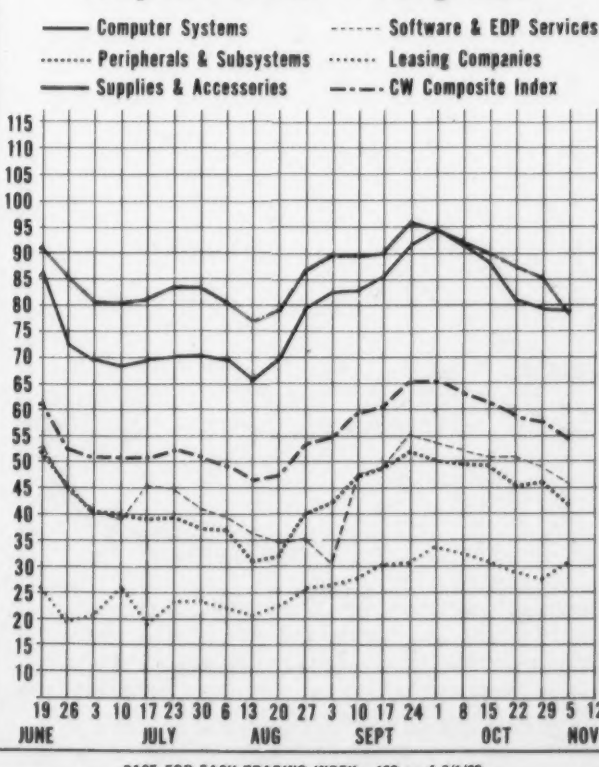
| | | | | | |
|----------------------|---------|---------|--------|-------|--|
| N IBM | 223-387 | 292 5/8 | -5 7/8 | -1.9 | |
| N NCR | 30- 86 | 34 5/8 | -1 1/8 | -3.1 | |
| N RCA | 18- 34 | 23 5/8 | + 7/8 | +3.8 | |
| N RAYTHEON CO | 16- 33 | 20 3/8 | - 3/4 | -3.5 | |
| O SCI. CONTROL CORP. | 1- 8 | 2 1/8 | + 3/8 | +21.4 | |
| N SPERRY RAND | 19- 40 | 22 1/4 | -1 | -4.3 | |
| A SYSTEMS ENG. LABS | 10- 49 | 16 7/8 | -1 5/8 | -8.7 | |
| N VARIAN ASSOCIATES | 9- 29 | 13 1/4 | + 1/8 | +0.9 | |
| A WANG LABS. | 18- 51 | 33 1/2 | - 7/8 | -2.5 | |
| N XEROX CORP | 66-115 | 83 1/2 | -3 3/8 | -3.8 | |

LEASING COMPANIES

| | | | | | |
|------------------------|--------|--------|-------|-------|--|
| O BOOTHE COMPUTER | 8- 25 | 12 3/4 | + 1/2 | +4.0 | |
| O BRESNAHAN COMP. | 3- 8 | 2 7/8 | 0 | 0.0 | |
| O COMPUTER EXCHANGE | 2- 8 | 5 | - 1/4 | -4.7 | |
| A COMPUTER INVSTRS GRP | 4- 12 | 7 7/8 | - 7/8 | -10.0 | |
| O COMPUTER LEASING | 3- 18 | 3 | 0 | 0.0 | |
| N DATA PROC. F & G | 6- 32 | 12 3/4 | 0 | 0.0 | |
| O DATRONIC RENTAL | 2- 8 | 3 1/4 | - 1/4 | -7.1 | |
| A DEARBORN COMPUTER | 10- 24 | 20 1/4 | + 7/8 | +4.5 | |
| O DIEBOLD COMP. LEAS. | 2- 8 | 3 7/8 | + 5/8 | +19.2 | |
| A DPA, INC. | 3- 10 | 4 1/8 | - 1/2 | -10.8 | |
| A GRANITE MGT | 7- 22 | 10 1/4 | - 1/8 | -1.2 | |
| A GREYHOUND COMPUTER | 5- 44 | 7 5/8 | + 7/8 | +12.9 | |
| N LEASCO DATA PROC. | 7- 30 | 12 3/8 | + 1/8 | +1.0 | |
| O LECTRO COMP LEAS | 2- 9 | 2 3/4 | 0 | 0.0 | |
| A LEVIN-TOWNSEND CMP | 3- 19 | 5 7/8 | + 1/4 | +4.4 | |
| O LMC DATA, INC. | 1- 3 | 1 1/2 | 0 | 0.0 | |
| O NCC INDUSTRIES | 3- 8 | 4 | - 1/4 | -5.8 | |
| O SYSTEMS CAPITAL | 1- 8 | 2 3/4 | - 1/8 | -4.3 | |
| N U.S. LEASING | 3- 19 | 13 7/8 | + 1/8 | +0.9 | |

EXCH: N=NEW YORK EXCHANGE; A=AMERICAN EXCHANGE
L=NATIONAL EXCHANGE; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

Computer Stocks Trading Index



Earnings Reports

LMC DATA INC.
Six Months Ended August 31
1970 1969
Revenue \$1,757,469 \$1,937,477
Loss 269,213 158,515
a-Not restated to reflect year-end equipment writeoffs.

WANG LABORATORIES INC.
Three Months Ended Sept. 30
1970 1969
Shr Ernd \$.18 \$.14
Revenue 7,748,012 5,466,228
Earnings 712,459 541,188
a-Adjusted for a two-for-one stock split in November, 1969.

POTTER INSTRUMENT CO.
Three Months Ended Sept. 30
1970 1969
Shr Ernd \$.14 \$.14
Revenue 6,550,000 7,167,000
Earnings 390,000 337,000

APPLIED DATA RESEARCH
Three Months Ended Sept. 30
1970 1969
Shr Ernd \$.05 \$.08
Revenue 1,852,151 1,610,336
Spec Cred 677,216
Earnings 123,740 75,366
9 Mo Shr .16
Revenue 5,128,545 4,656,131
Spec Cred 677,216
Earnings (Loss) (230,590) 152,891
a-Based on income before special credit. b-Resulting from partial redemption of convertible debentures. c-Equal to 13 cents a share.

TELEX CORP.
Three Months Ended Sept. 30
1970 1969
aShr Ernd \$.27 \$.11
Revenue 23,678,000 13,097,000
Earnings 2,862,000 1,066,000
a6 Mo Shr .50 b.19
Revenue 40,428,000 22,556,000
Earnings 5,199,000 1,837,000

a-On a primary basis. b-Adjusted for a five-for-one stock split in May 1970.
Share earnings, assuming full dilution, were 27 cents in the quarter and 50 cents in the six months of 1970, compared with 10 cents and 18 cents, respectively, in 1969.

DIEBOLD COMPUTER LEASING
Three Months Ended Sept. 30
1970 1969
Shr Ernd \$.12 \$.08
Revenue 8,148,000 7,933,000
Earnings 485,000 315,000
9 Mo Shr .33 .29
Revenue 24,779,000 22,894,000
Earnings 1,313,000 1,225,000

On a fully diluted basis, earnings per share would be 11 cents in 1970 quarter, and 7 cents in 1969 quarter, and 30 cents and 26 cents, respectively, in the nine month period.

BOOTHE COMPUTER CORP.
Three Months Ended Sept. 30
1970 1969
Shr Ernd \$.42 \$.33
Revenue 10,207,000 9,847,000
Earnings 785,000 634,000
9 Mo Shr 1.22 1.10
Revenue 30,704,000 28,433,000
Earnings 2,288,000 2,041,000

a-Adjusted for 10% stock dividend in June 1970.
Fully diluted share earnings were 39 cents in the quarter and \$1.12 in the nine months of 1970, compared with 32 cents and \$1 in 1969.

UARCO INC.
Year Ended Sept. 30
a1970 1969
Shr Ernd \$.216 \$.02
Revenue 98,599,900 88,700,200
Earnings 4,431,600 4,134,700
3 Mo Shr .46 .70
Revenue 25,891,300 23,705,000
Earnings 946,800 1,431,100

a-Includes operations of Drummond Business Forms Ltd., since April 1, 1970.

BALTIMORE BUSINESS FORMS
Three Months Ended Sept. 30
1970 1969
Shr Ernd \$.01 \$.18
Revenue 4,155,054 4,431,607
Earnings 14,008 135,881
9 Mo Shr .36 .69
Revenue 12,839,887 13,373,157
Earnings 280,040 512,381

DATA TRENDS INC.
Year Ended June 30
1970 1969
Shr Ernd \$.54
Revenue 7,254,664 \$944,366
Earnings (Loss) 505,511 a(2,031,795)
a-Company's principal facility largely destroyed by fire.

ESL INC.
Three Months Ended Sept. 30
1970 1969
Shr Ernd \$.17 \$.12
Revenue 2,893,156 2,205,165
Earnings 120,794 74,858
9 Mo Shr .45 .30
Revenue 8,329,845 5,341,213
Earnings 305,589 290,409

Announcing Autoflow's Fifth First.

First First: 1966

The first software product listed on the General Services Administration (GSA) schedule.

Second First: 1967

The first software product selected by Industrial Research Magazine as one of the 100 most significant technical products of 1967.

Third First: 1968

The first software product with over 500 installations.

Fourth First: 1969

The first software product with over 1000 installations.

And now the Fifth First: 1970

Autoflow is the first software product to be granted a United States Patent. (Issued October 6, 1970. Patent No. 3,533,086.)

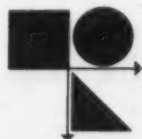
Autoflow has proven itself in over 1400 installations, in virtually every type of system. Large, small or anywhere in between.

If you couldn't justify Autoflow before... look again. Because while we're getting our "firsts" we were also building in additions to help in debugging and maintenance. Like three new listings for 360 assembly users (EQU, Macro Usage and Modified Tag Summaries). And new features for 360 COBOL users.

And to help in conversion and maintenance of second generation programs we've just released our 360 system that processes 1400 series Autocoder and SPS and our 7070 and 7080 Autocoder Autoflow Language Processors.

That's in addition to our 14 input languages and 12 output listings. In all, the 1970 Autoflow is three times more comprehensive than the original. And we're constantly working on newer features.

Call any ADR office for a demonstration. We'll be glad to share our "firsts" with you.



APPLIED DATA RESEARCH THE SOFTWARE BUILDERS

CREATORS OF AUTOFLOW, METACOBOL, LIBRARIAN,
SAM, ROSCOE, IAM, STAR AND PI SORT.

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